

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# **RESPIRATORY SYSTEM**

**By Dr Ahmed Amer**

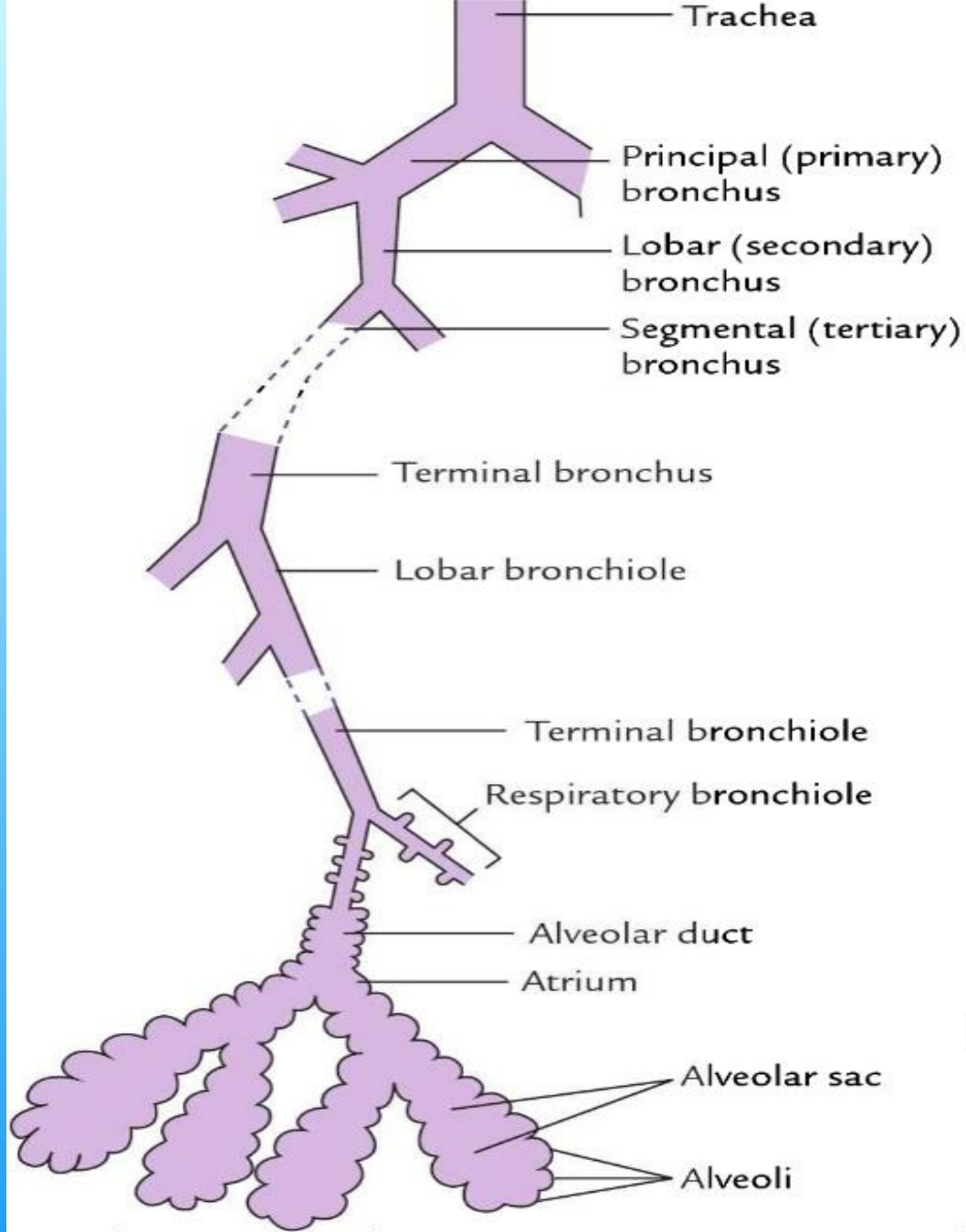


# RESPIRATORY SYSTEM

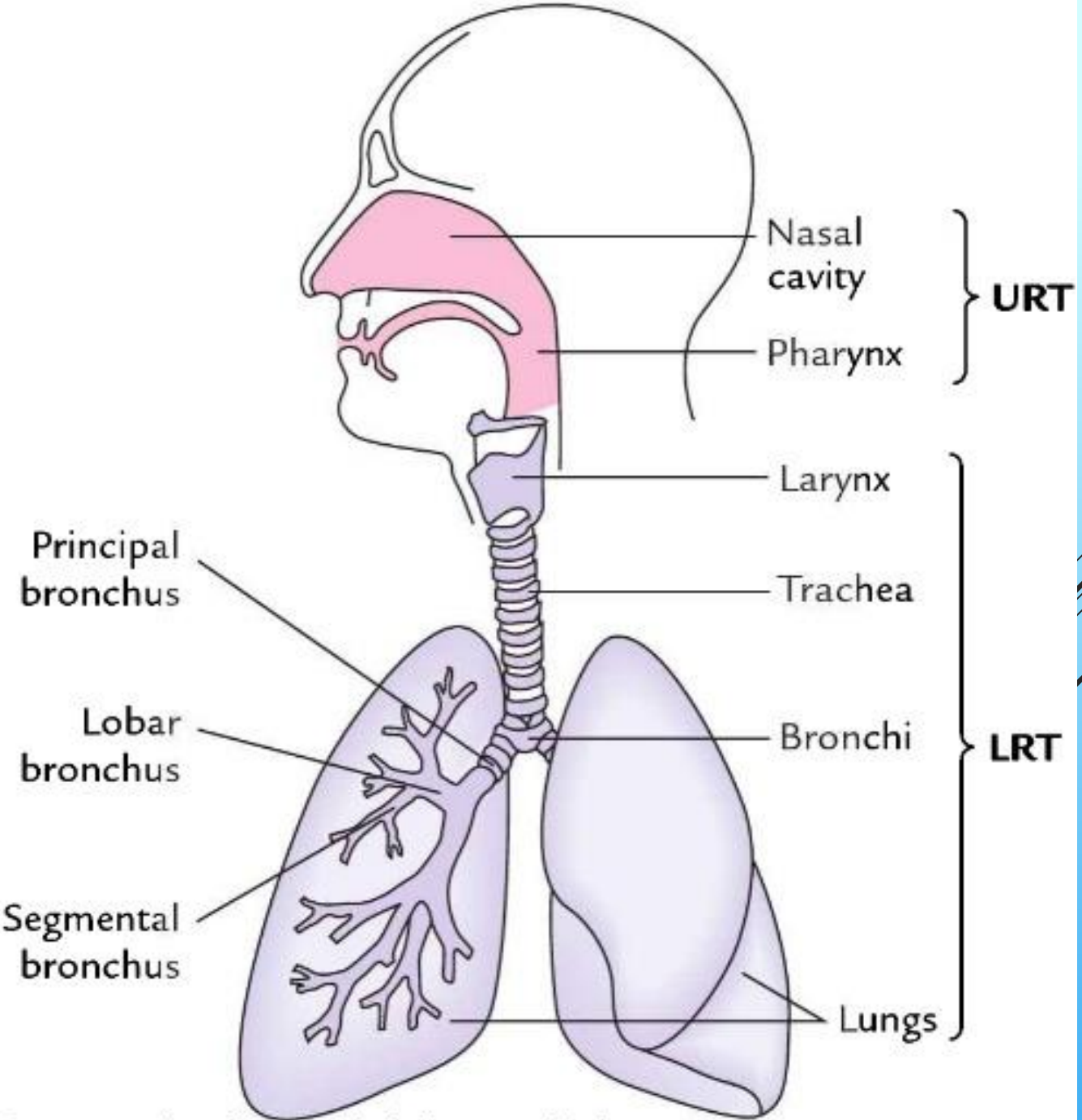
**Definition:** The respiratory system is concerned with breathing, which is the process of inhalation and exhalation of air during respiration.

**Components of Respiratory System**





Conducting and respiratory portions of trachea and lungs.



Anatomical subdivisions of the respiratory system.

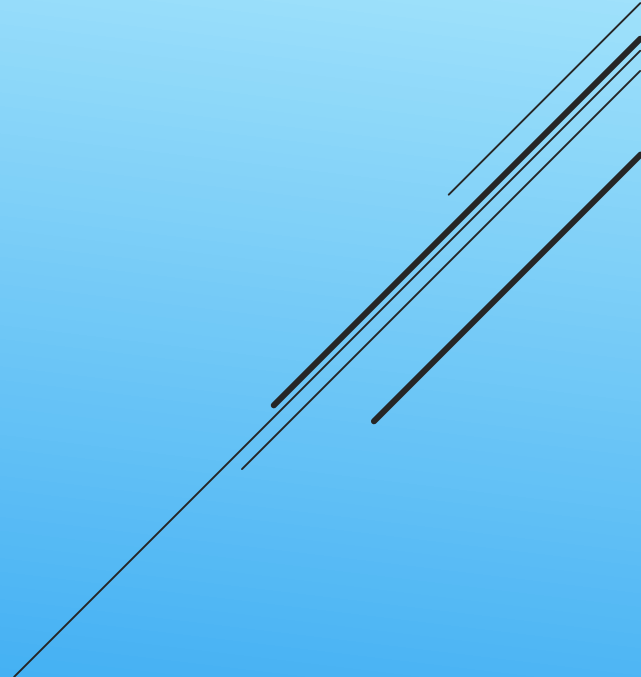
# RESPIRATORY SYSTEM

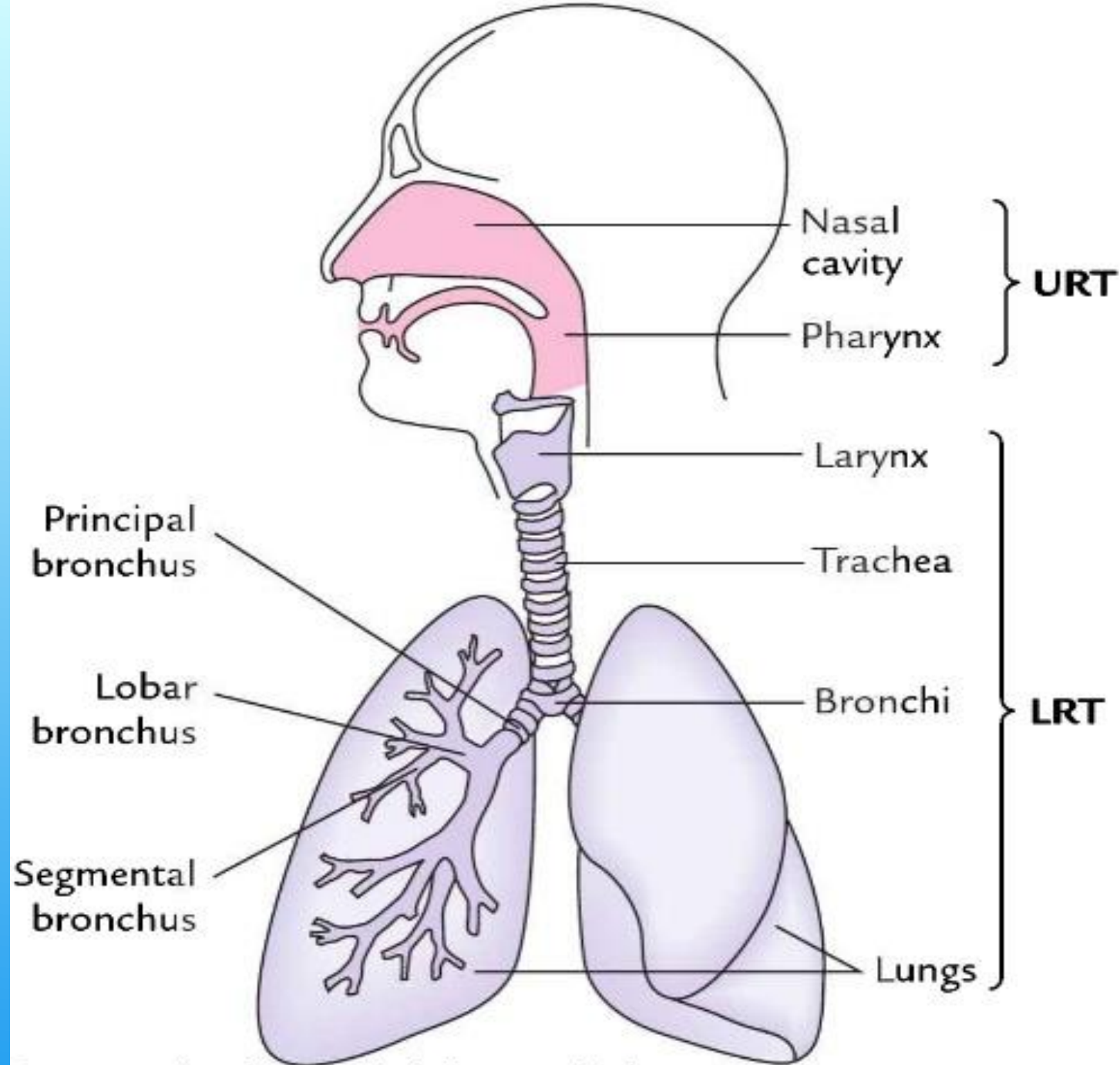
□ **Anatomically**, respiratory system is broadly divided into the following two parts:

**1. Upper respiratory tract (URT): It comprises:**

- a) Nasal cavities
- b) Pharynx and associated structures

**2. Lower respiratory tract (LRT): It comprises:**

- a) Larynx
  - b) Trachea
  - c) Bronchi
  - d) Lungs
- 



Anatomical subdivisions of the respiratory system.

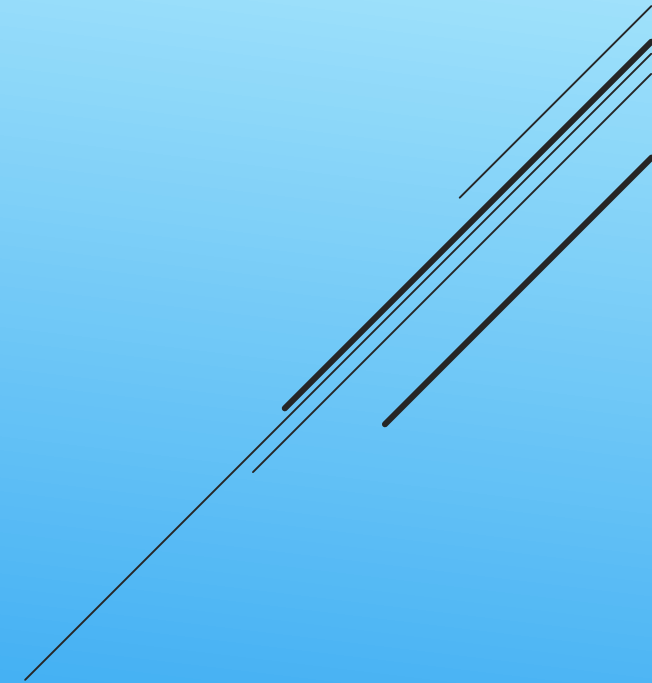
# RESPIRATORY SYSTEM

□ **Functionally**, however, the respiratory system is divided into the following two portions:

1. **Upper conducting portion**
2. **Lower respiratory portion**

□ **The conducting portion of respiratory system comprises:**

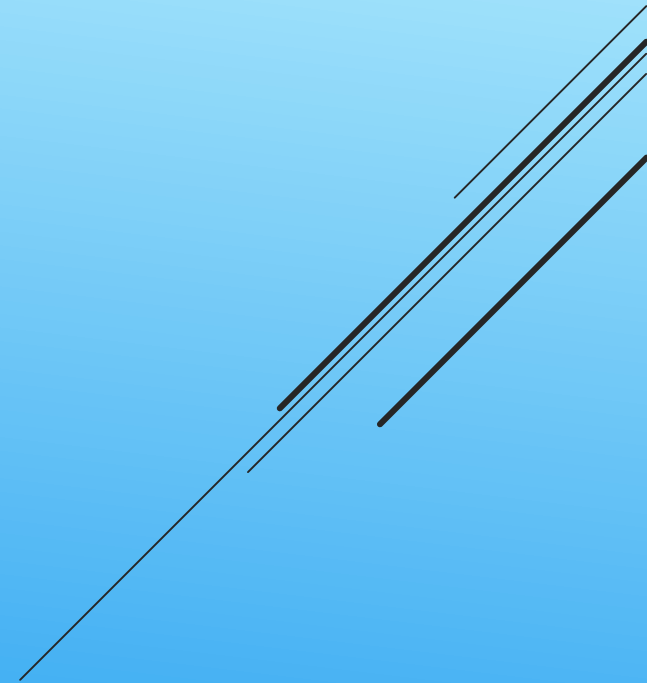
1. **Nasal cavities**
2. **Pharynx**
3. **Larynx**
4. **Trachea**
5. **Bronchi**
6. **Bronchioles**
7. **Terminal bronchioles**



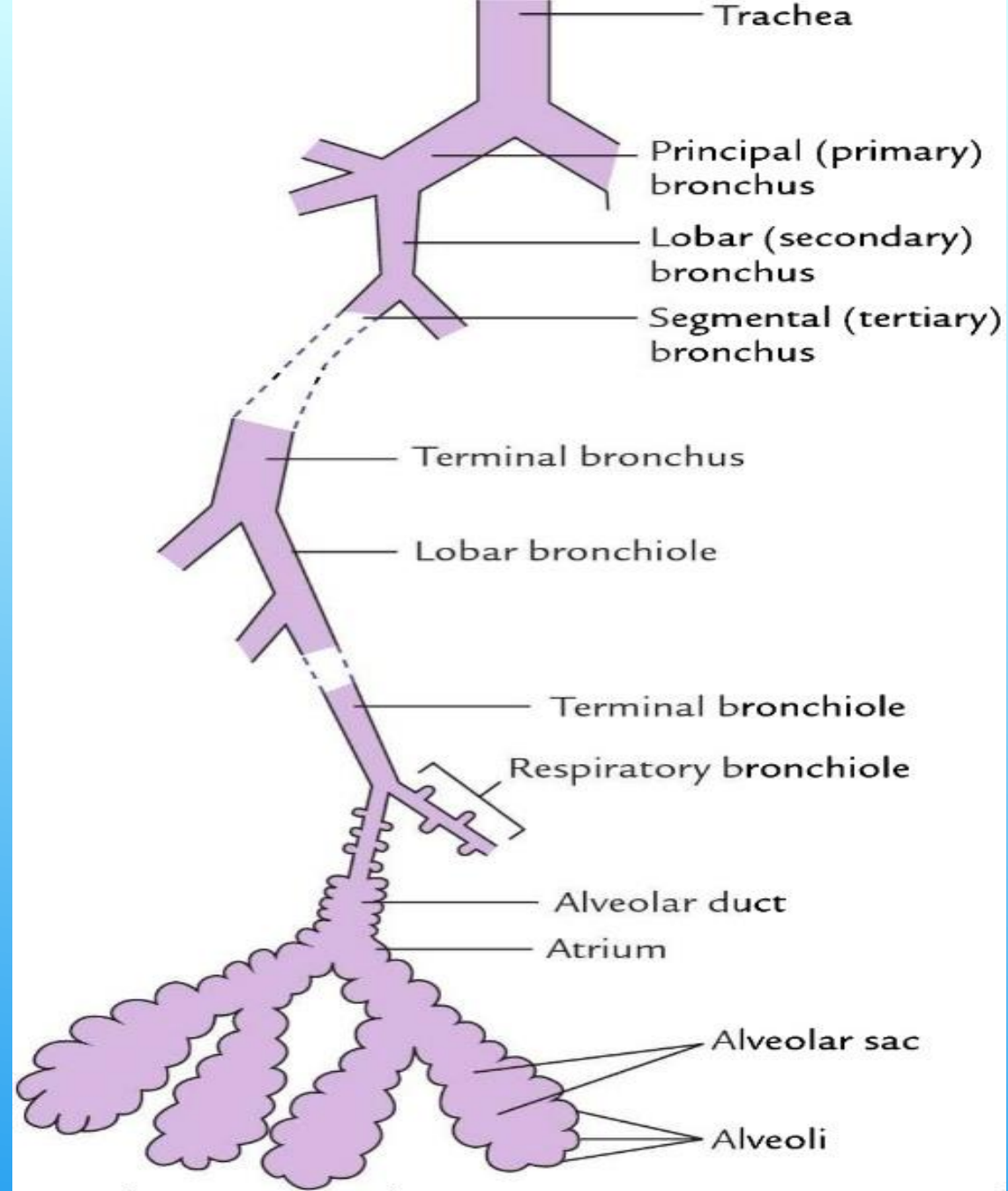
# RESPIRATORY SYSTEM

□ **The respiratory portion of respiratory system comprises:**

- 1. Respiratory bronchioles**
- 2. Alveolar ducts**
- 3. Alveolar sacs**
- 4. Alveoli**







**Conducting and respiratory portions of trachea and lungs.**

# RESPIRATORY SYSTEM

## Function:

□ The main functions of the conducting portions of the respiratory system are as follows:

1. Provide a conduit through which air can travel to and from the lungs.
2. Condition the inspired air, i.e. filters, warms and moistens the air while it is passing through it.
3. Vocalization

□ The main function of respiratory portion of respiratory system is:

exchange of gases (oxygen and carbon dioxide) between air and blood, i.e. the air is absorbed and carbon dioxide is eliminated.

# RESPIRATORY SYSTEM

## Paranasal air sinuses

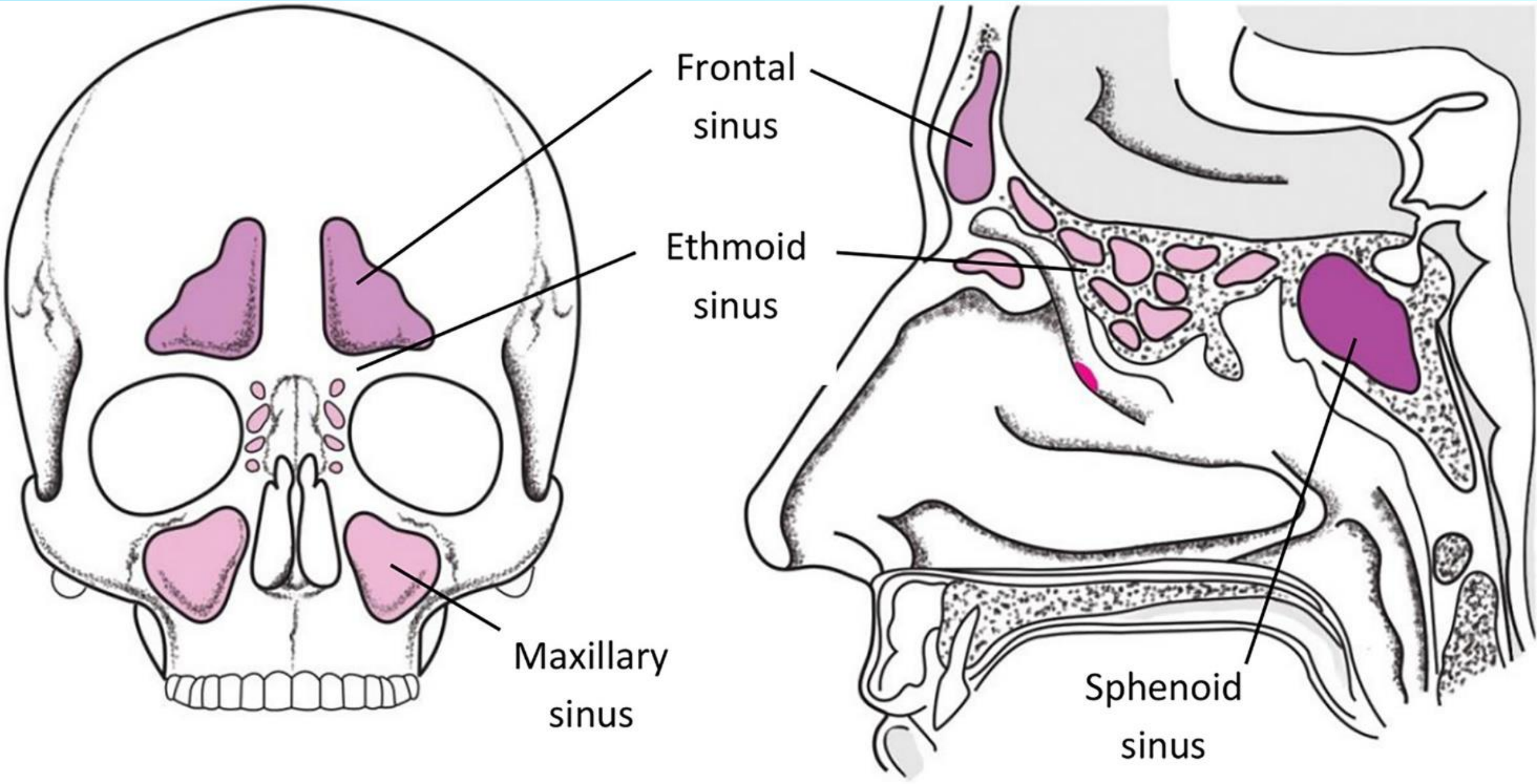
The paranasal sinuses are the frontal, ethmoidal, sphenoidal and maxillary sinuses, housed within the bones of the same name.

They all open into the lateral wall of the nasal cavity by small apertures.

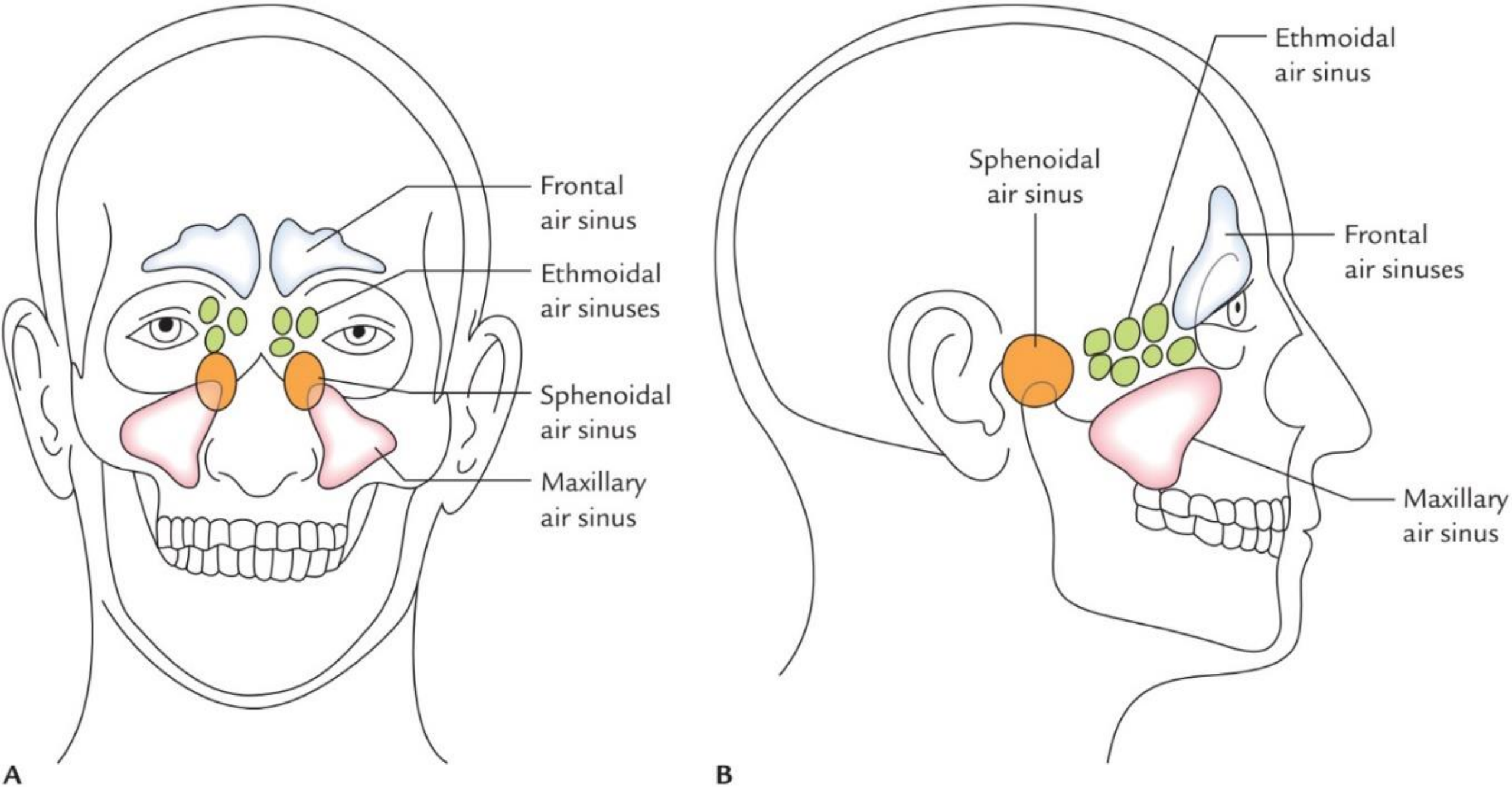
### Functions:

1. Add some resonance to the voice
2. Allow the enlargement of local areas of the skull without increase in bony mass.
3. Warming of air

# RESPIRATORY SYSTEM



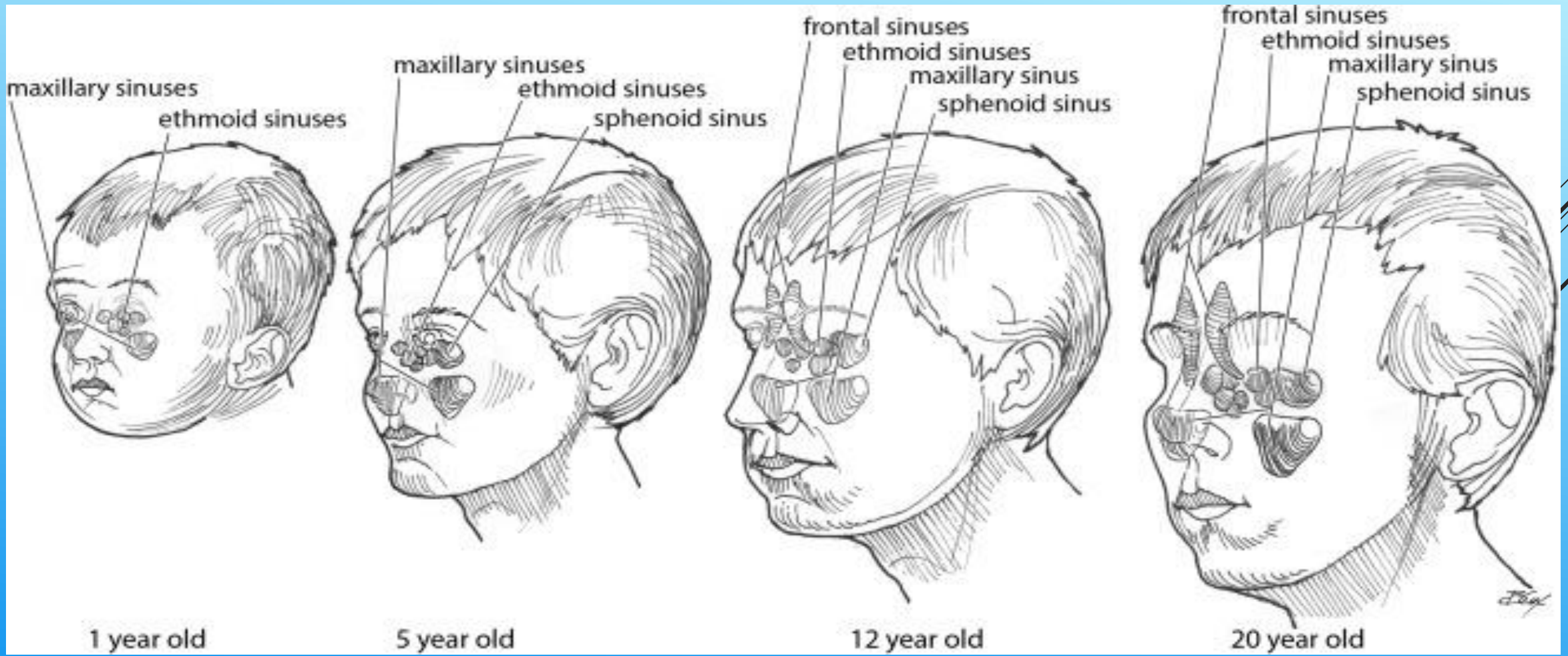




Positions of paranasal air sinuses on the surface: **A**, front view; **B**, side view.

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Most sinuses are rudimentary or absent at birth, but enlarge during the eruption of the permanent teeth and after puberty.



# RESPIRATORY SYSTEM

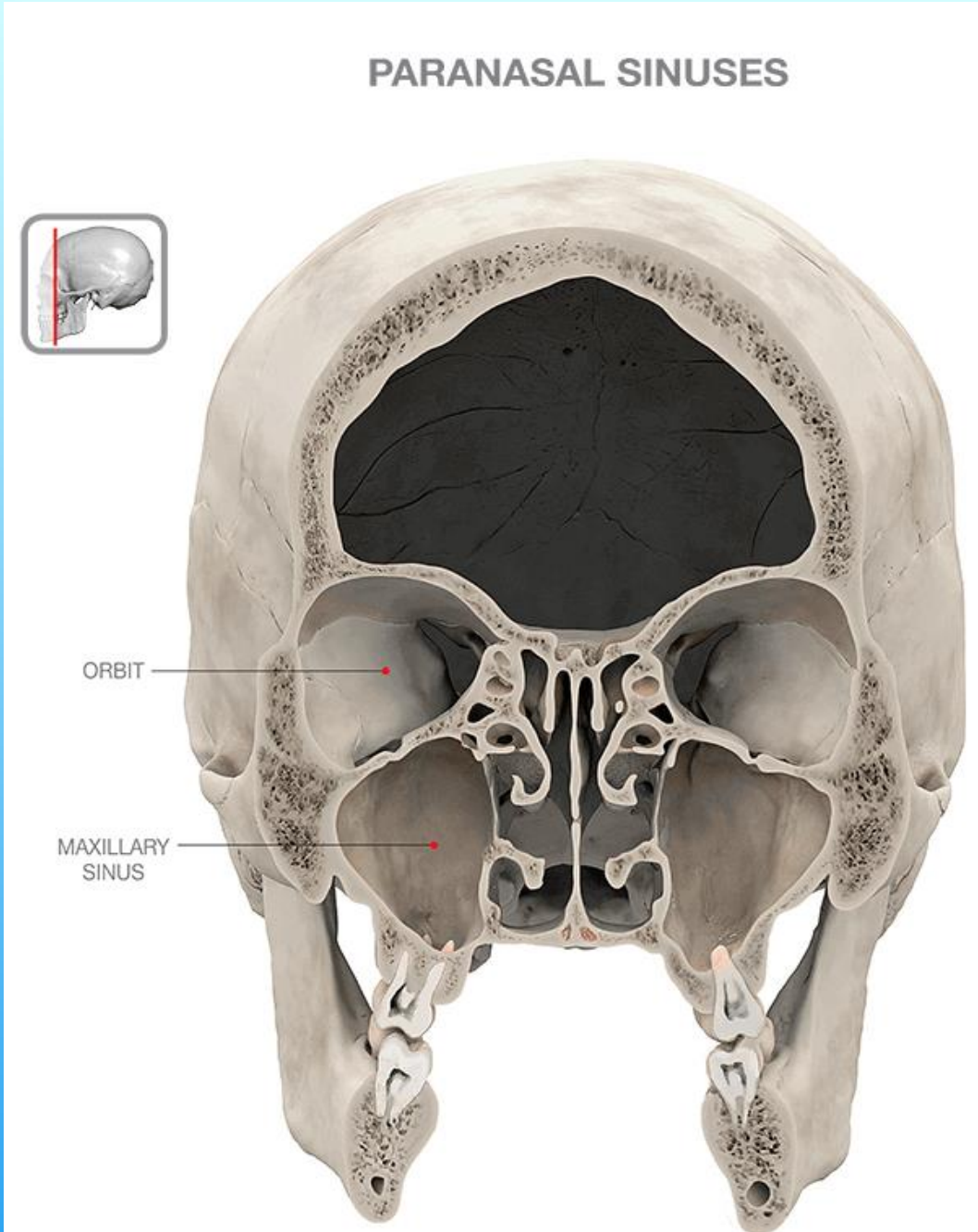
## The maxillary sinus

The largest of the paranasal sinuses.

Fills the body of the maxilla and is pyramidal in shape.

The base is medial and the apex is pointing toward the zygomatic process of maxilla.

Related to the roots of the teeth, especially the second premolar and first molar.

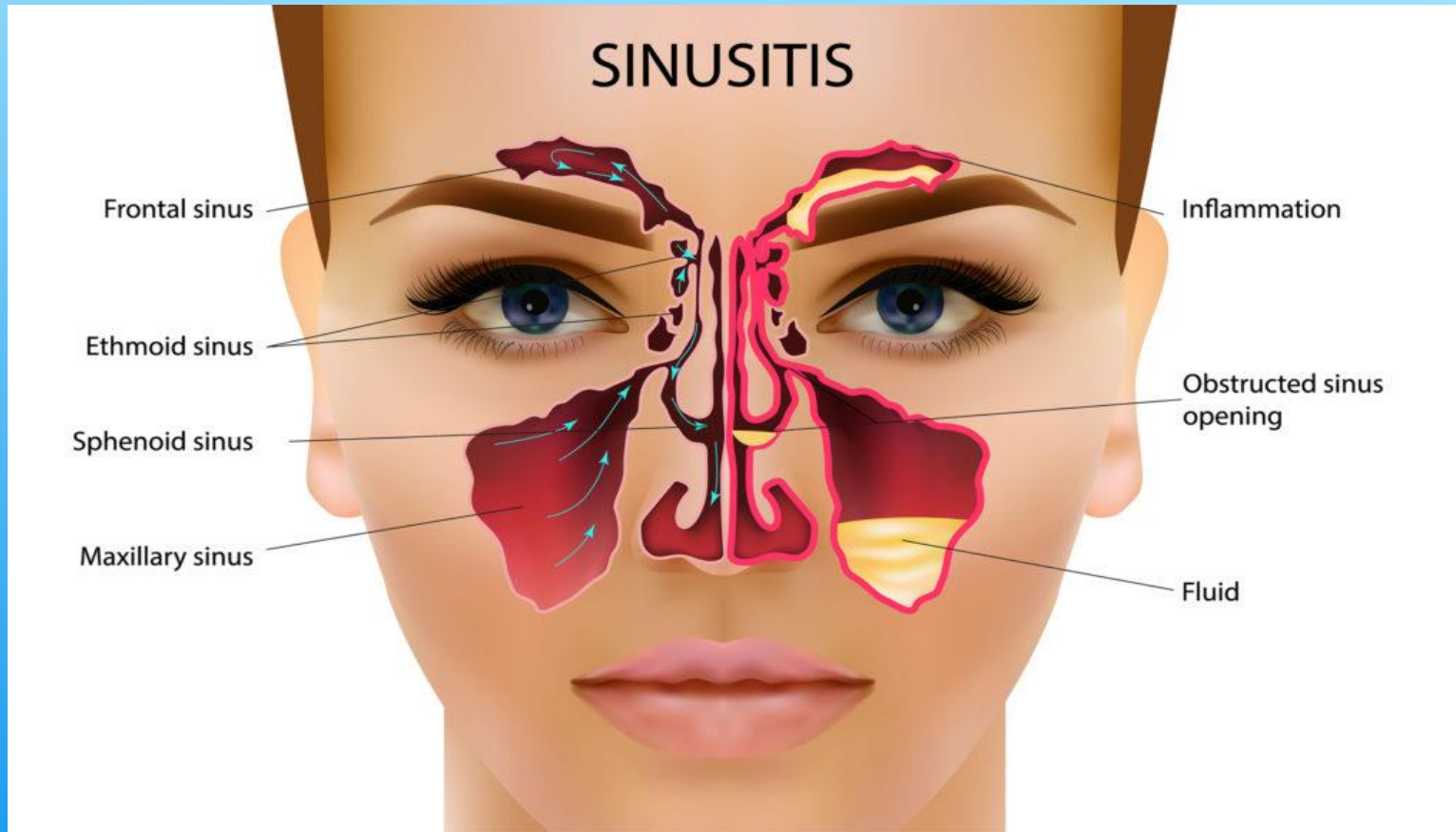




# RESPIRATORY SYSTEM

## The maxillary sinus

is the most susceptible to infections because of its close anatomical relation to the upper premolars and molars and the frontal and ant. Ethmoidal sinuses.





# RESPIRATORY SYSTEM

## The nose

The nose is the first part of the upper respiratory tract and is responsible for **warming, humidifying** and **filtering** inspired air

The nose is divided into **external nose** and **nasal cavity** (internal chamber).

A. **External nose** opens anteriorly at the ant. Nasal apertures (or nostrils), and consists of:

**Bony skeleton** formed by nasal bones and maxilla  
**cartilaginous framework**

**B**

Nasal bone

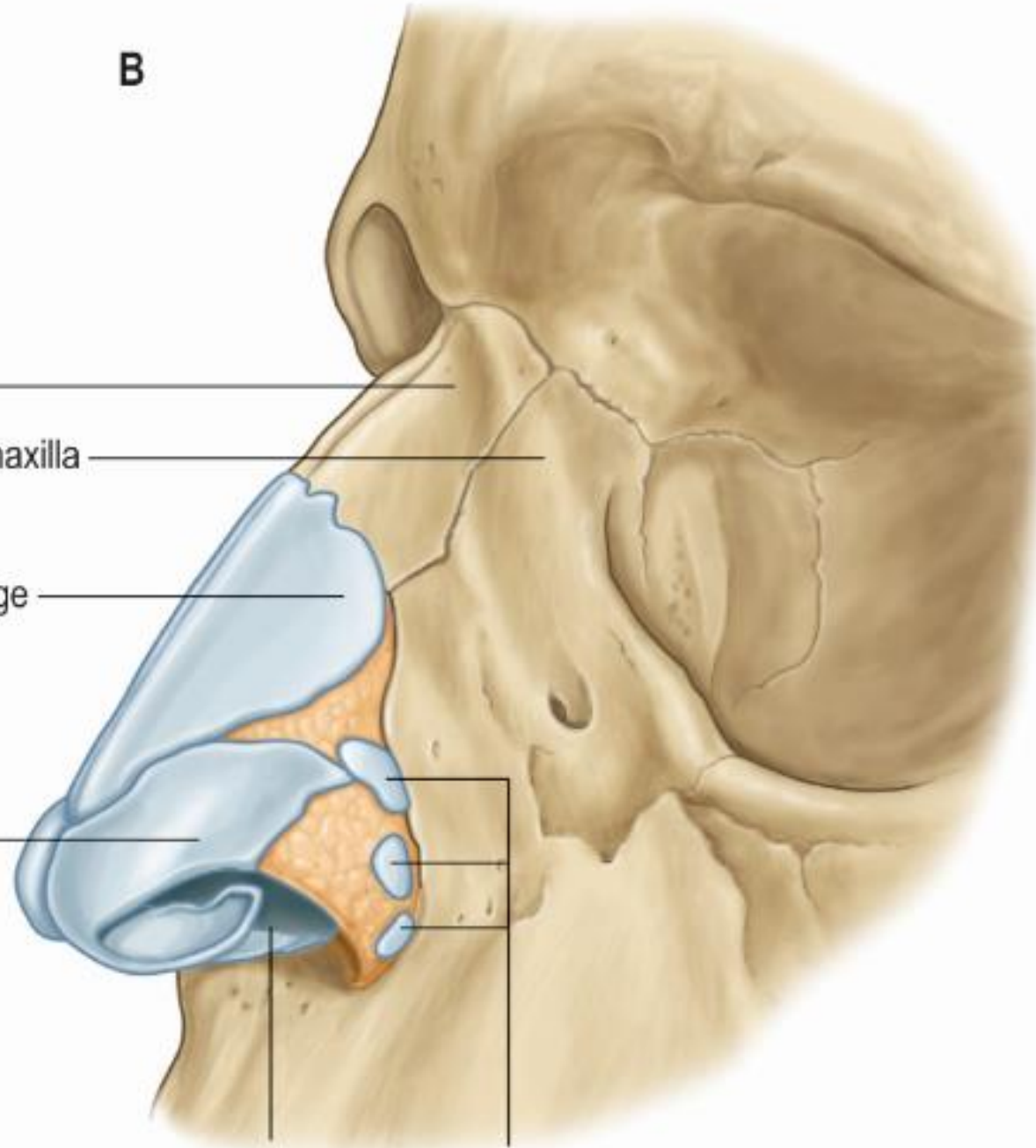
Frontal process of maxilla

Lateral nasal cartilage

Major alar cartilage

Septal cartilage

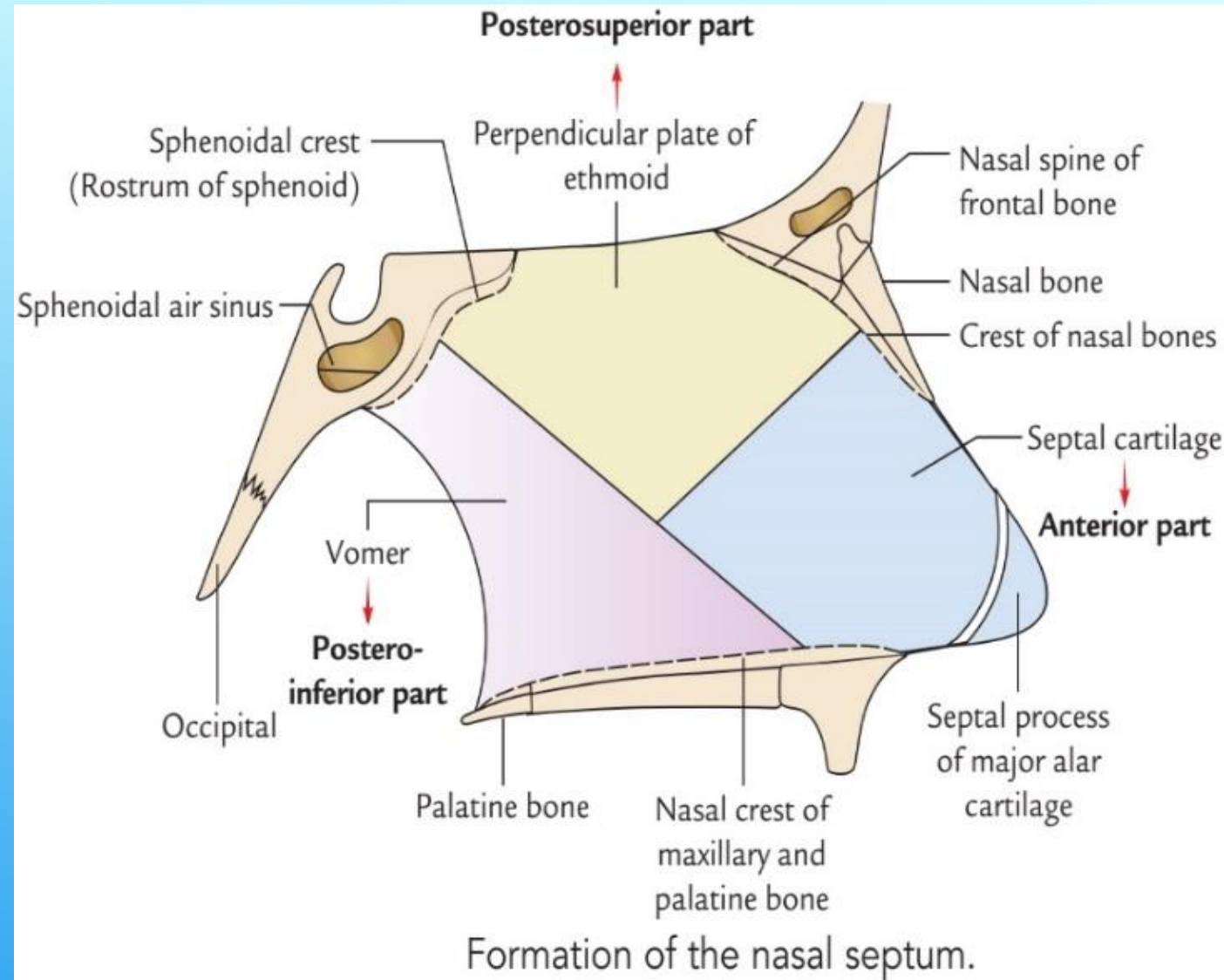
Minor cartilages of ala



# DIGESTIVE TRACT

**B. The nasal cavity** of the nose is divided into two cavities that are separated into Rt and Lt cavities by the nasal septum.

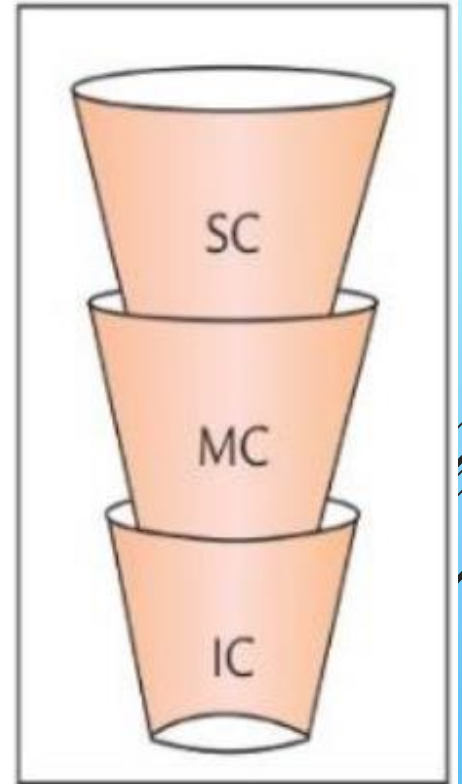
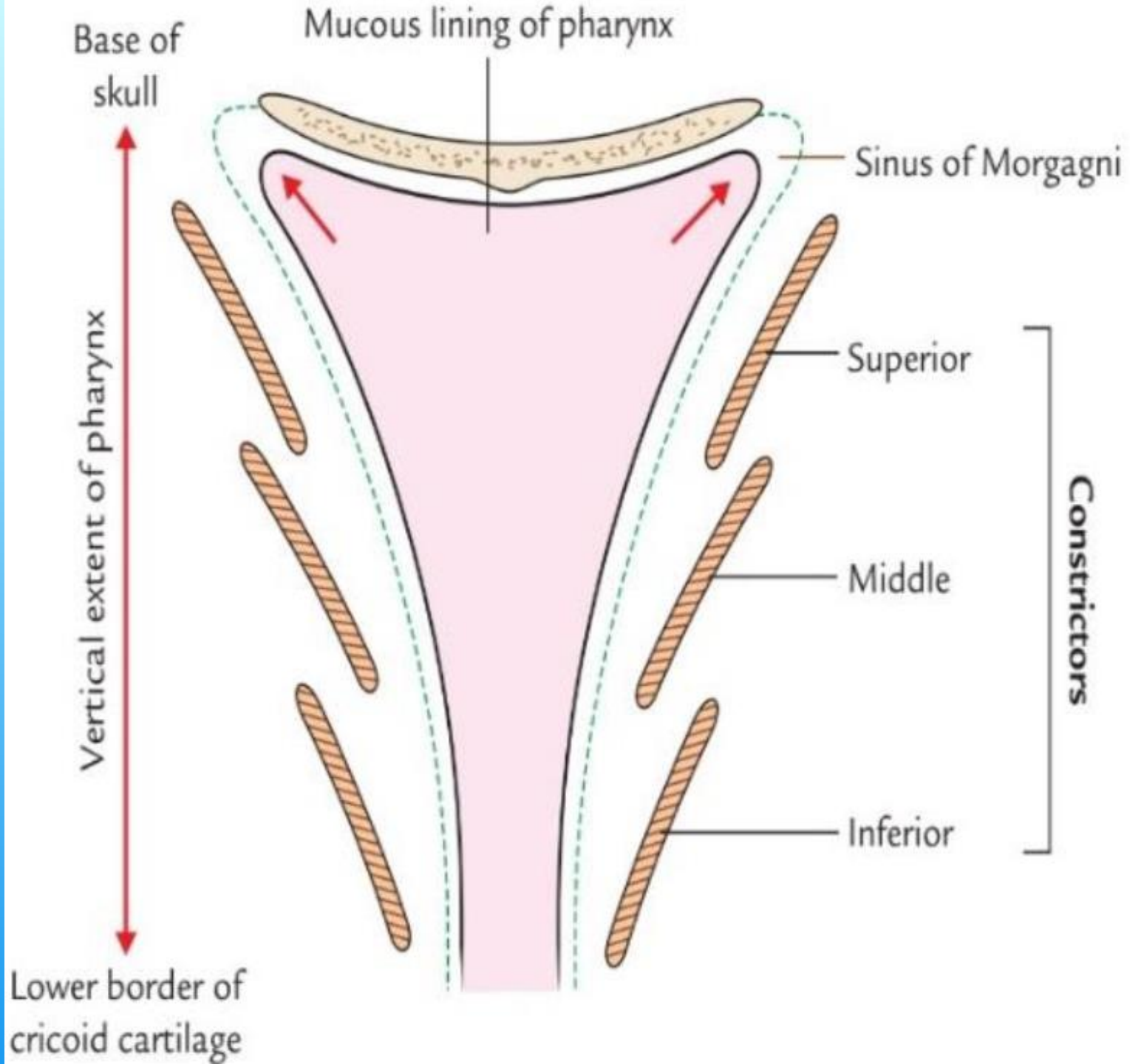
Opens posteriorly into the nasopharynx by the post. Nasal apertures



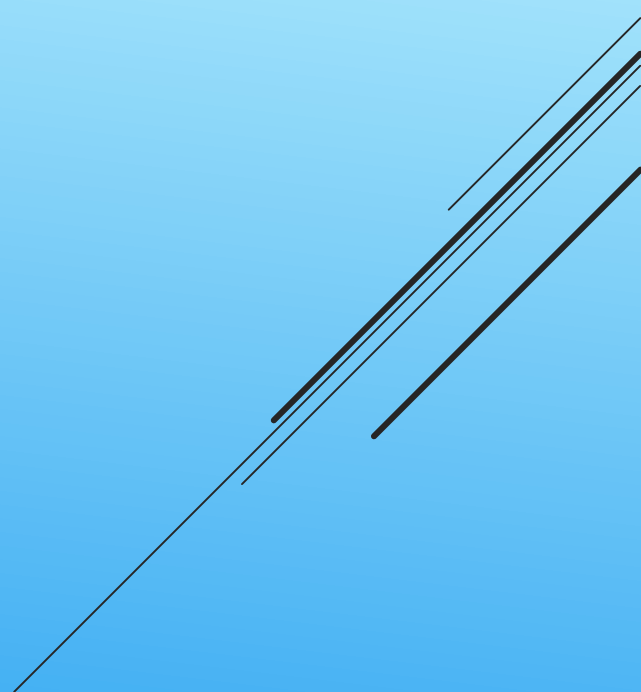
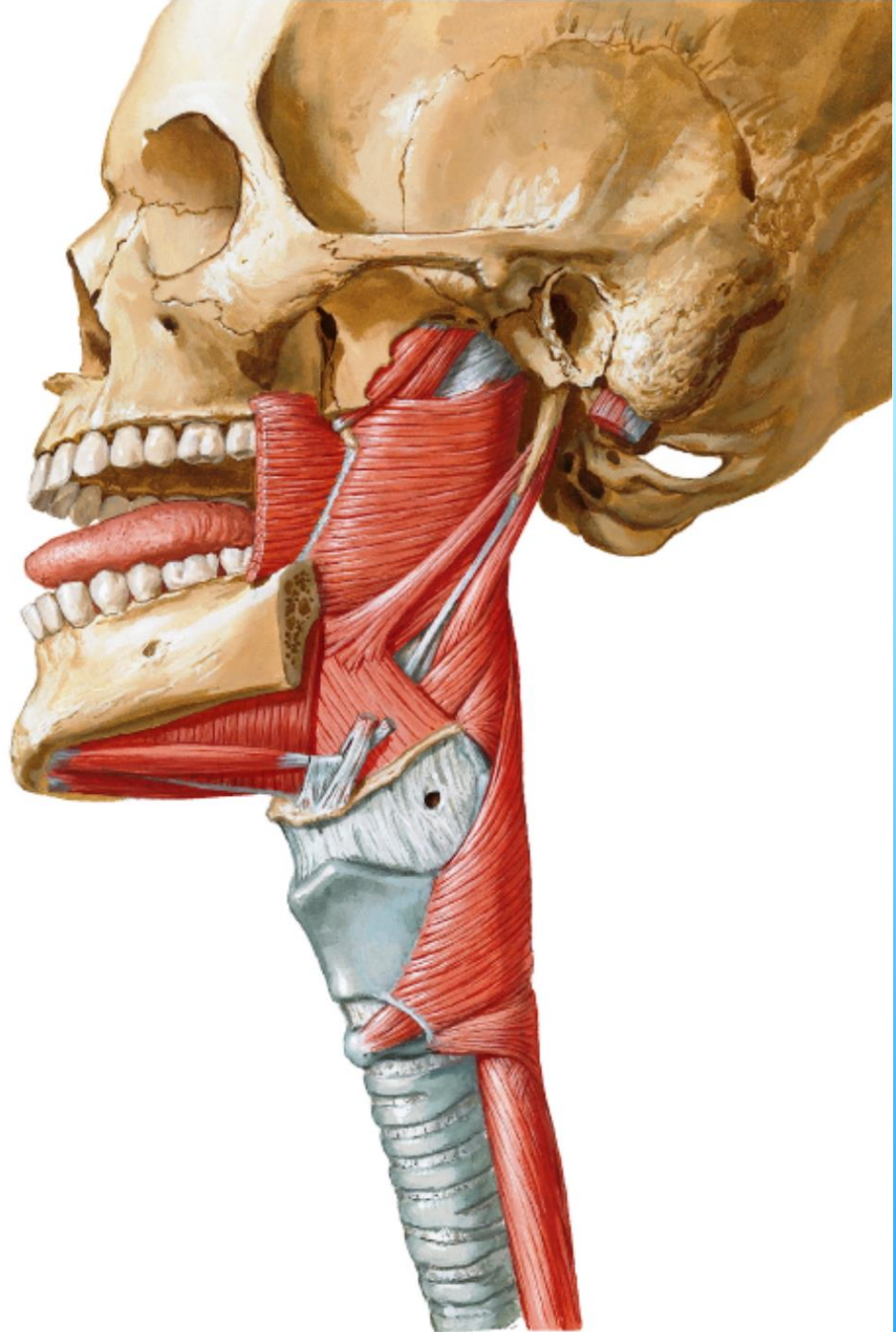
# DIGESTIVE TRACT

## Pharynx

- ❑ **Definition:** it is a muscular tube Extending from base of skull to the lower border of C6 vertebra.
- ❑ **Size & shape:** 5 inches long & funnel shaped.
- ❑ **The wall of the pharynx has:**
  - Three circular muscles (superior, middle and inferior constrictors)
  - Three longitudinal muscles (stylopharyngeus, palatopharyngeus, and salpingopharyngeus muscles).
- ❑ **The main function of the pharynx:** It receives bolus of food from oral cavity and directs it to the esophagus.







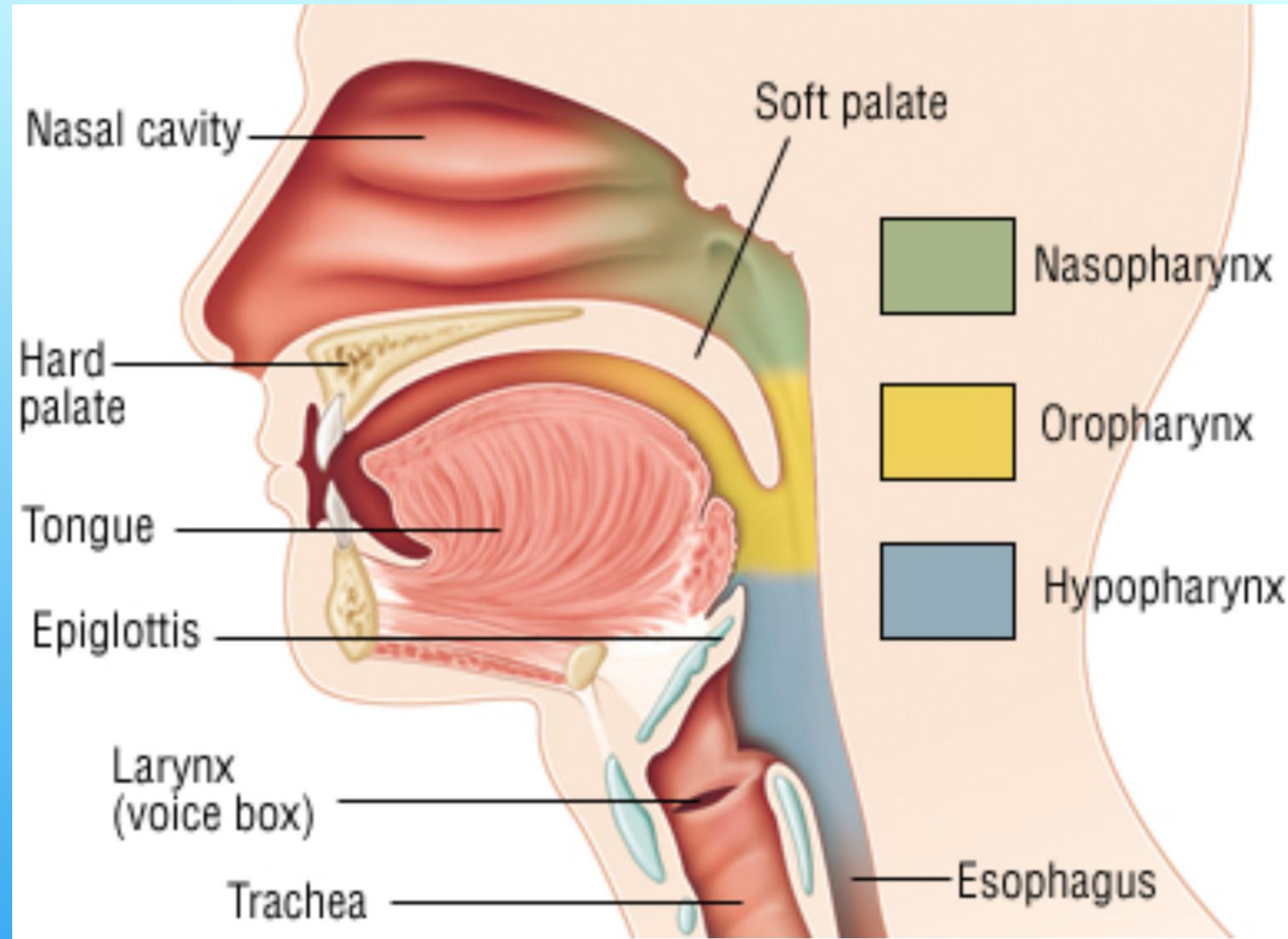
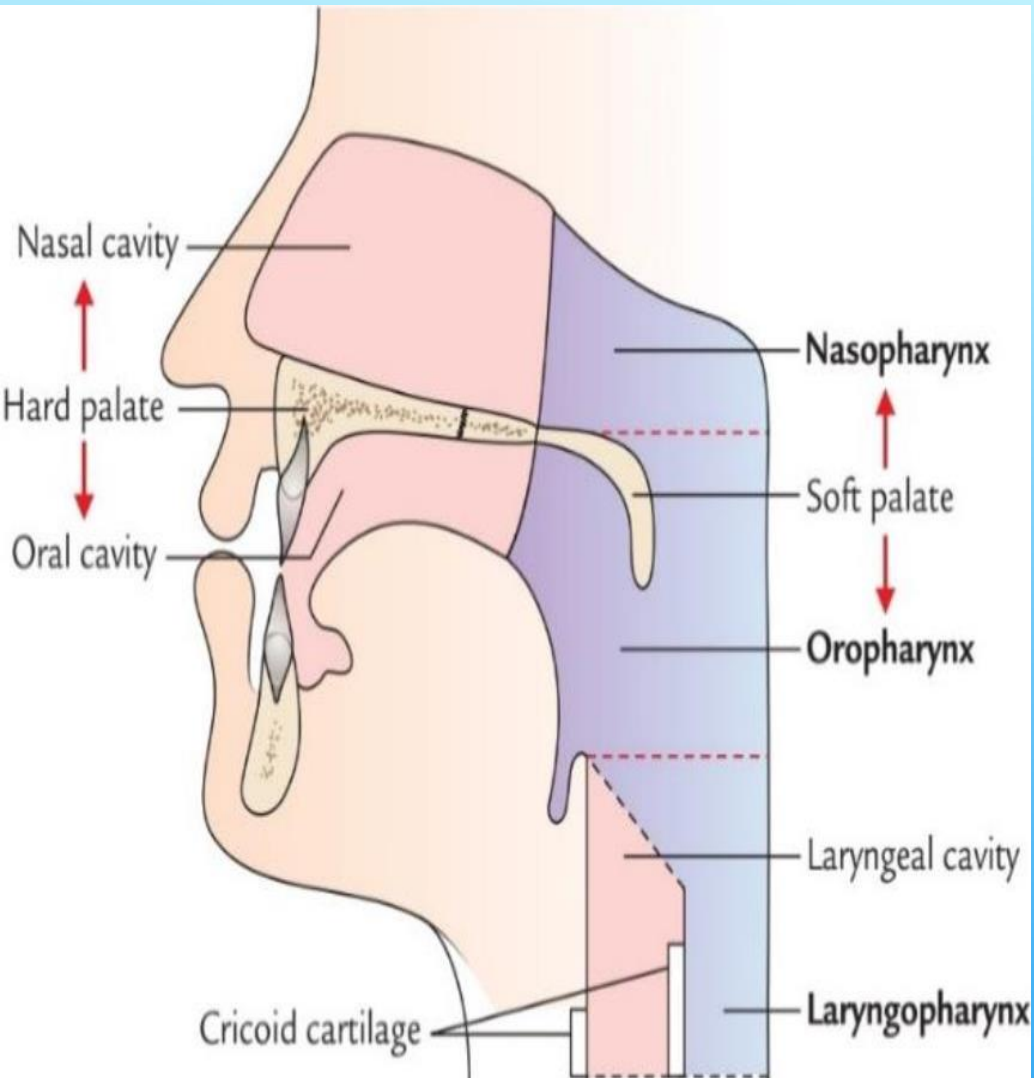
# DIGESTIVE TRACT

## Function of the pharynx:

- ❑ The successive contraction of the constrictor muscles propels the bolus of food down into the esophagus.
- ❑ The longitudinal muscles elevate the pharynx and larynx during swallowing.

# DIGESTIVE TRACT

## Parts of the pharynx



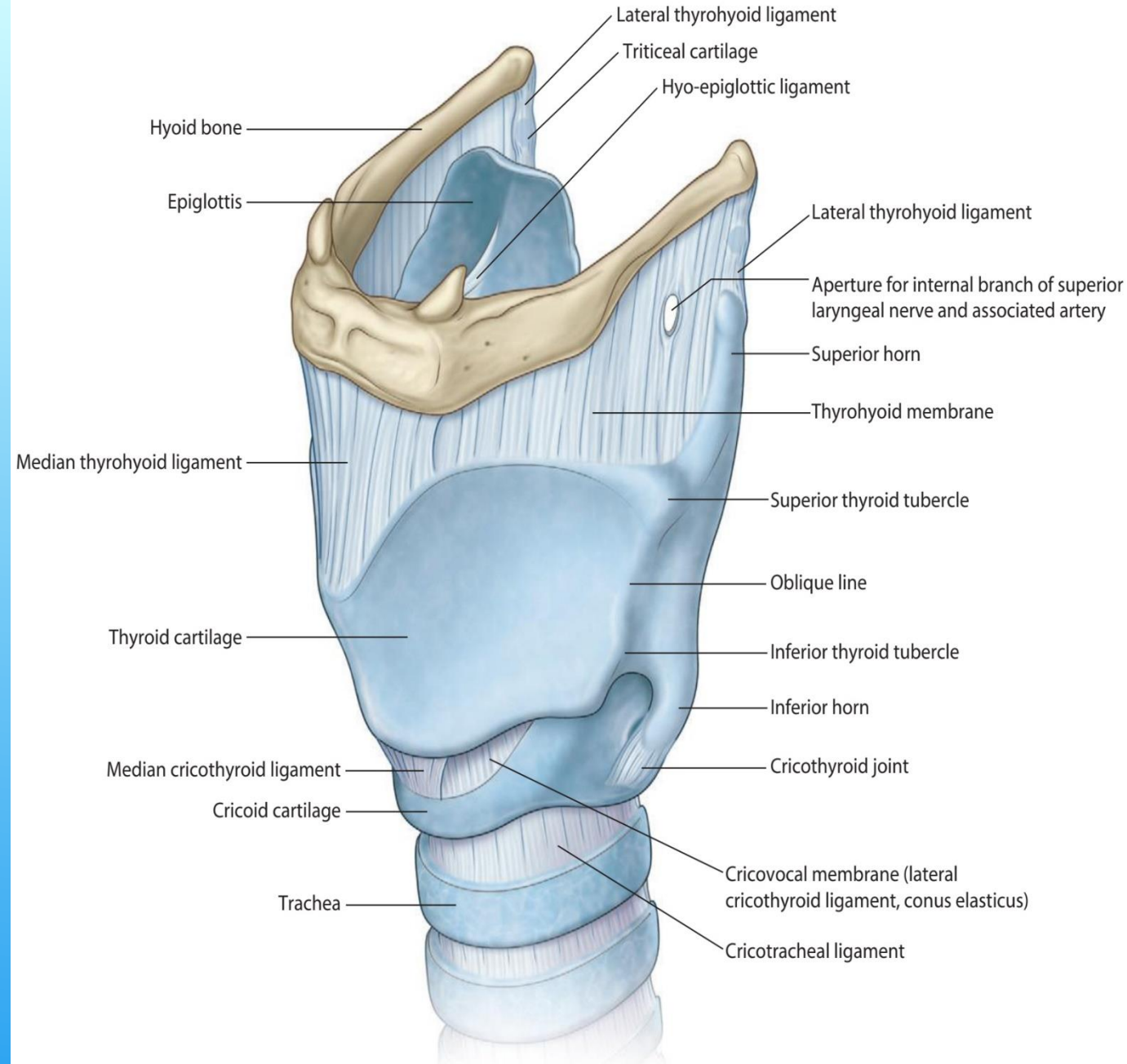


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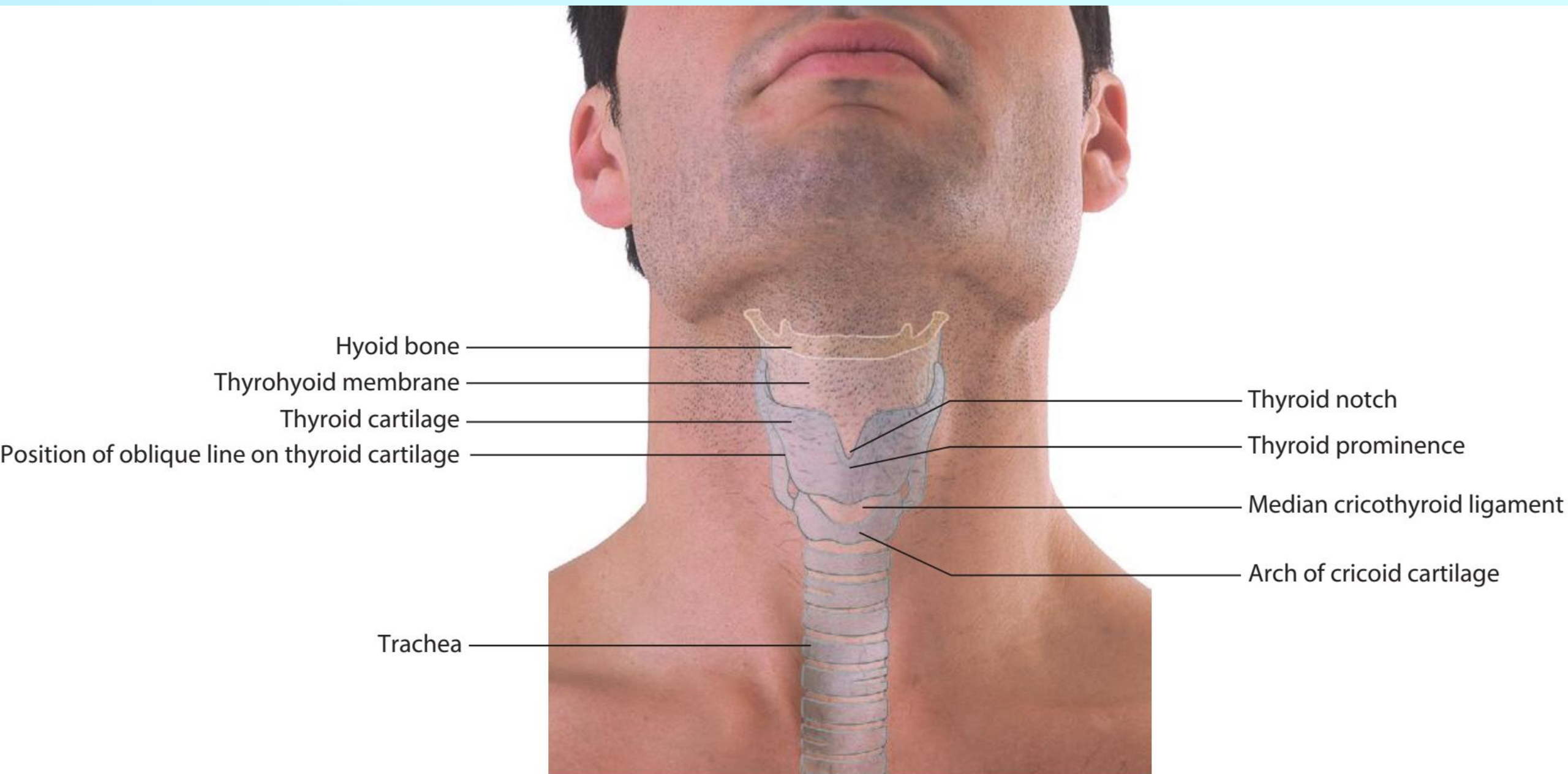
## Larynx (voice Box)

□ It connects the laryngopharynx with the trachea.

□ The lumen of larynx is kept patent by its rigid walls formed by **hyaline and elastic cartilages** that are united by **membranes**.



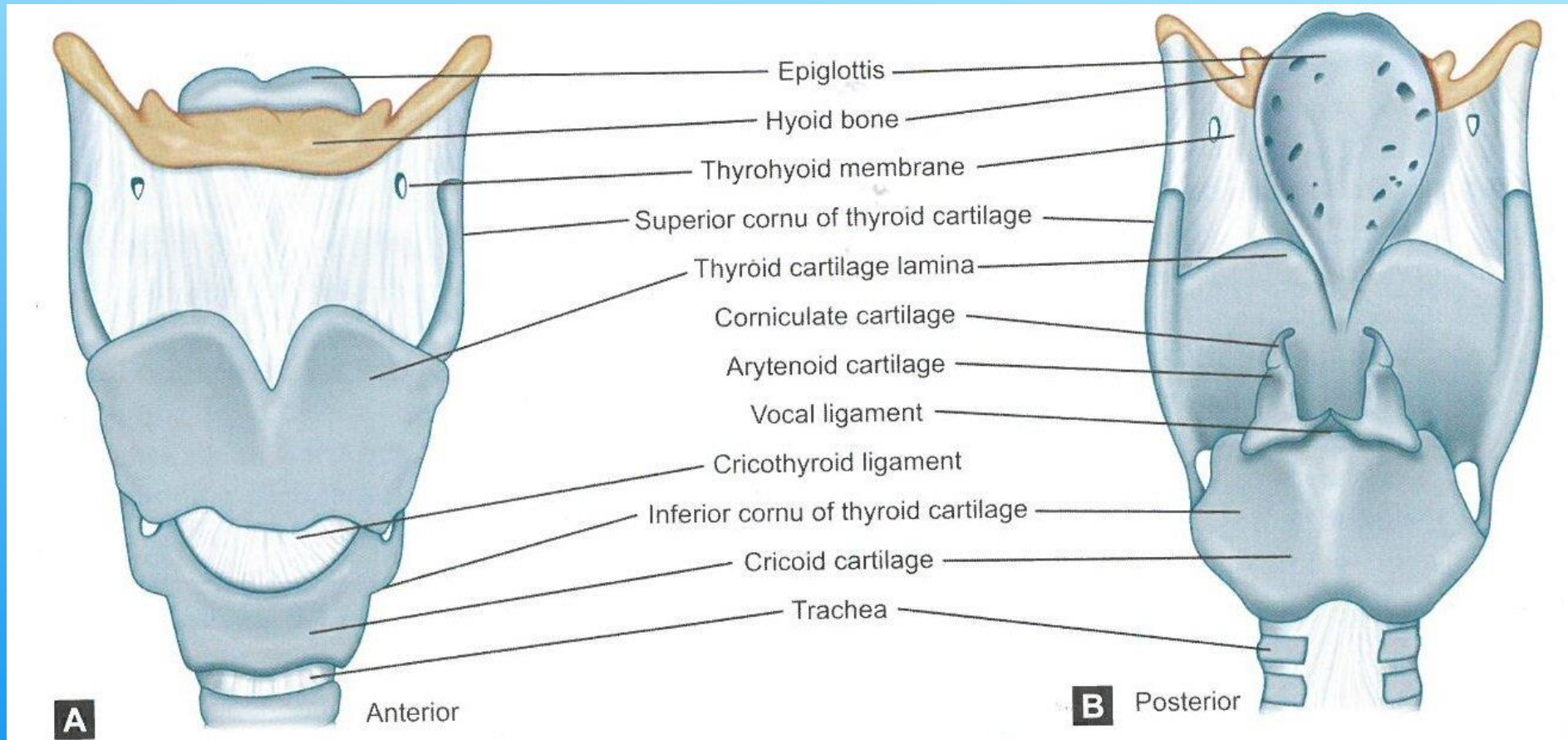
External features of the larynx (anterolateral view)



**Position of larynx in the neck as it relates to the surface**

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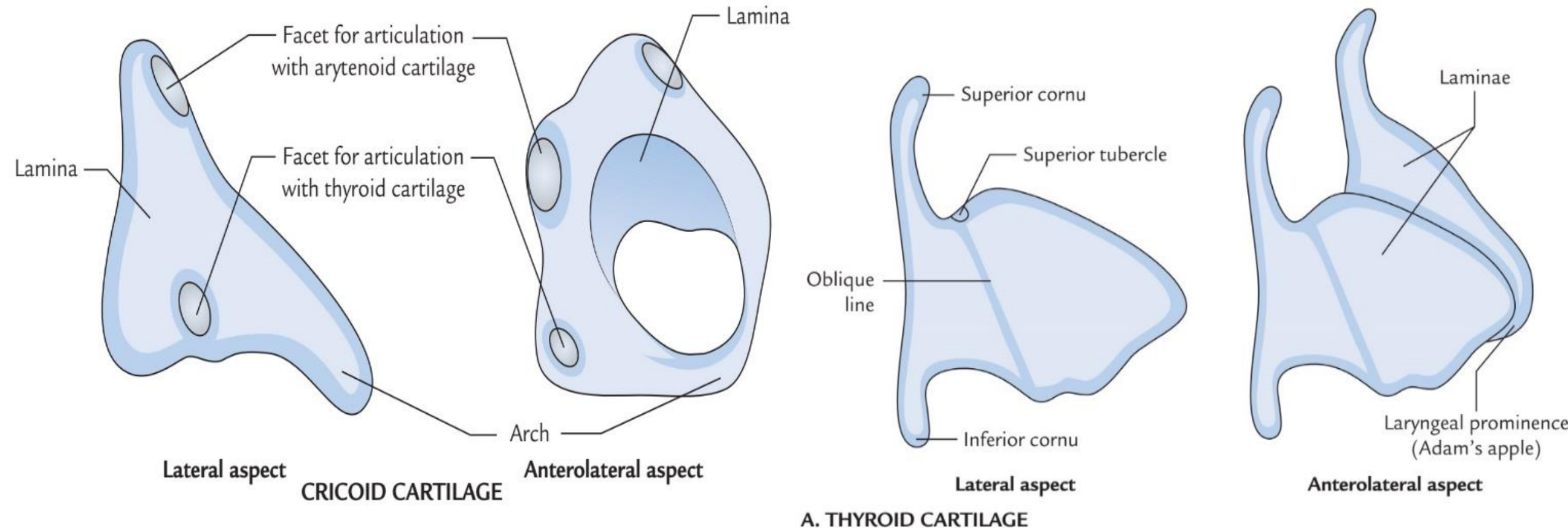
- The cartilages of the larynx are **nine**;
- ◆ **Three are unpaired**:- epiglottis, thyroid and cricoid.
- ◆ **Three are paired (6)**:- arytenoid, corniculate and cuneiform.





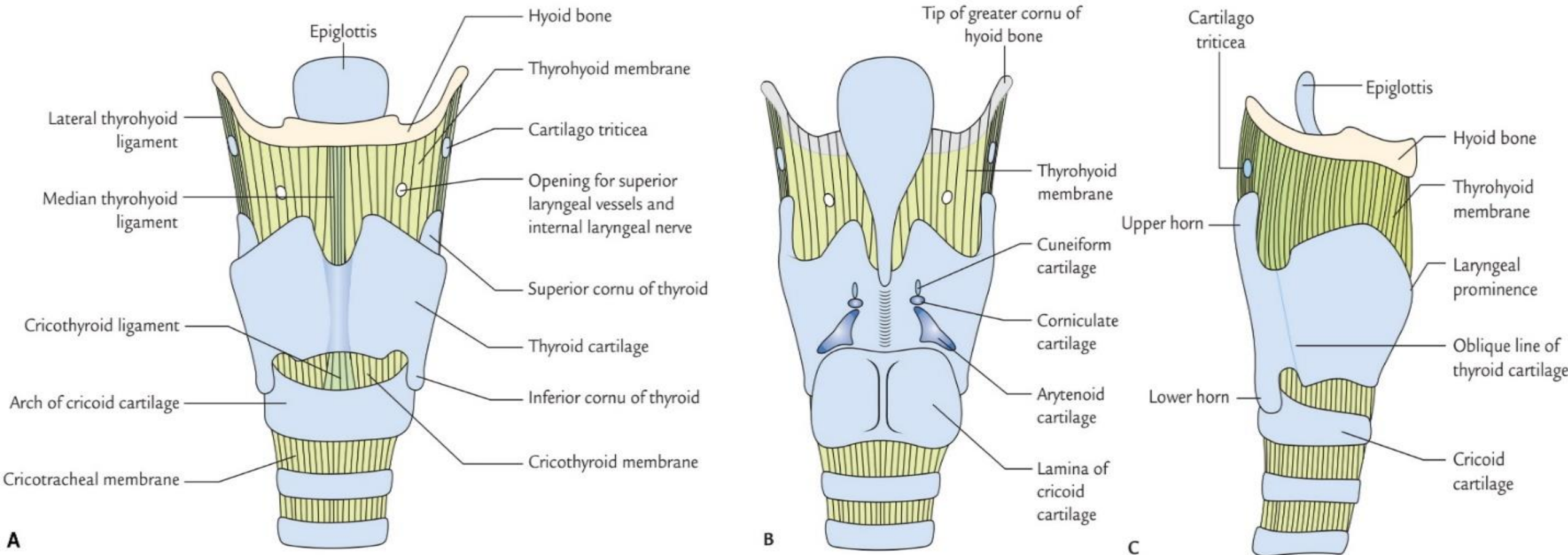
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- **The thyroid cartilage** is the largest and forms prominence on the front of neck (Adam's apple) in males.
- **The cricoid cartilage** completely encircles the lumen of larynx.



# RESPIRATORY SYSTEM

□ **Epiglottis:** a thin, leaf-like plate of elastic cartilage that projects obliquely upwards behind the tongue and hyoid body, and in front of the laryngeal inlet.

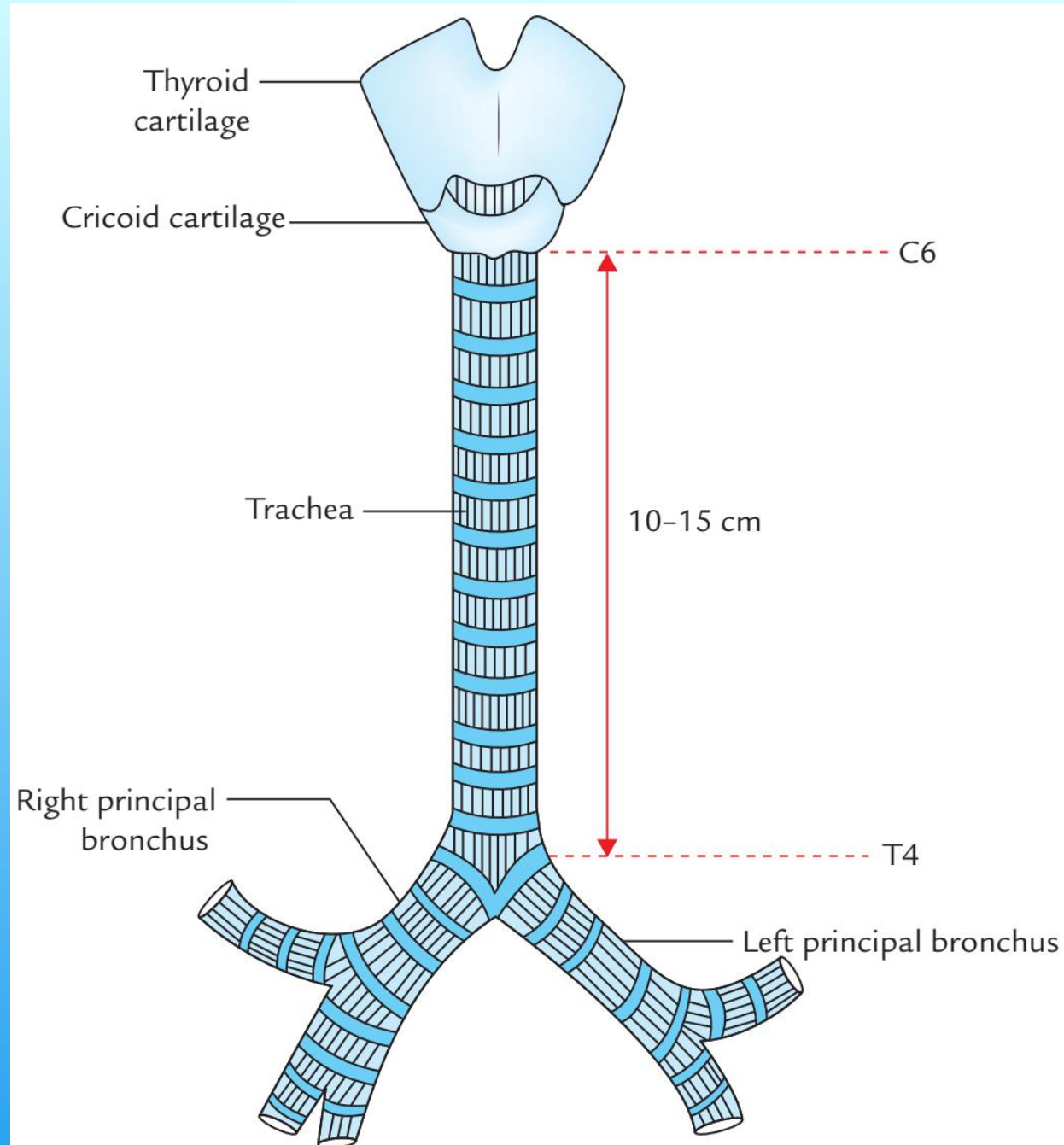


Skeleton of the larynx: A, anterior view; B, posterior view; C, lateral view.

# RESPIRATORY SYSTEM

## The Trachea

- **Length:** 10 cm.
- **Site:** its Upper **half** lies in **the neck** its lower half in the thorax
- **Course:**
  - > It **starts** as a continuation of larynx at the level of **C6**
  - > Runs downward in front of the vertebral Column separated from it by **esophagus**

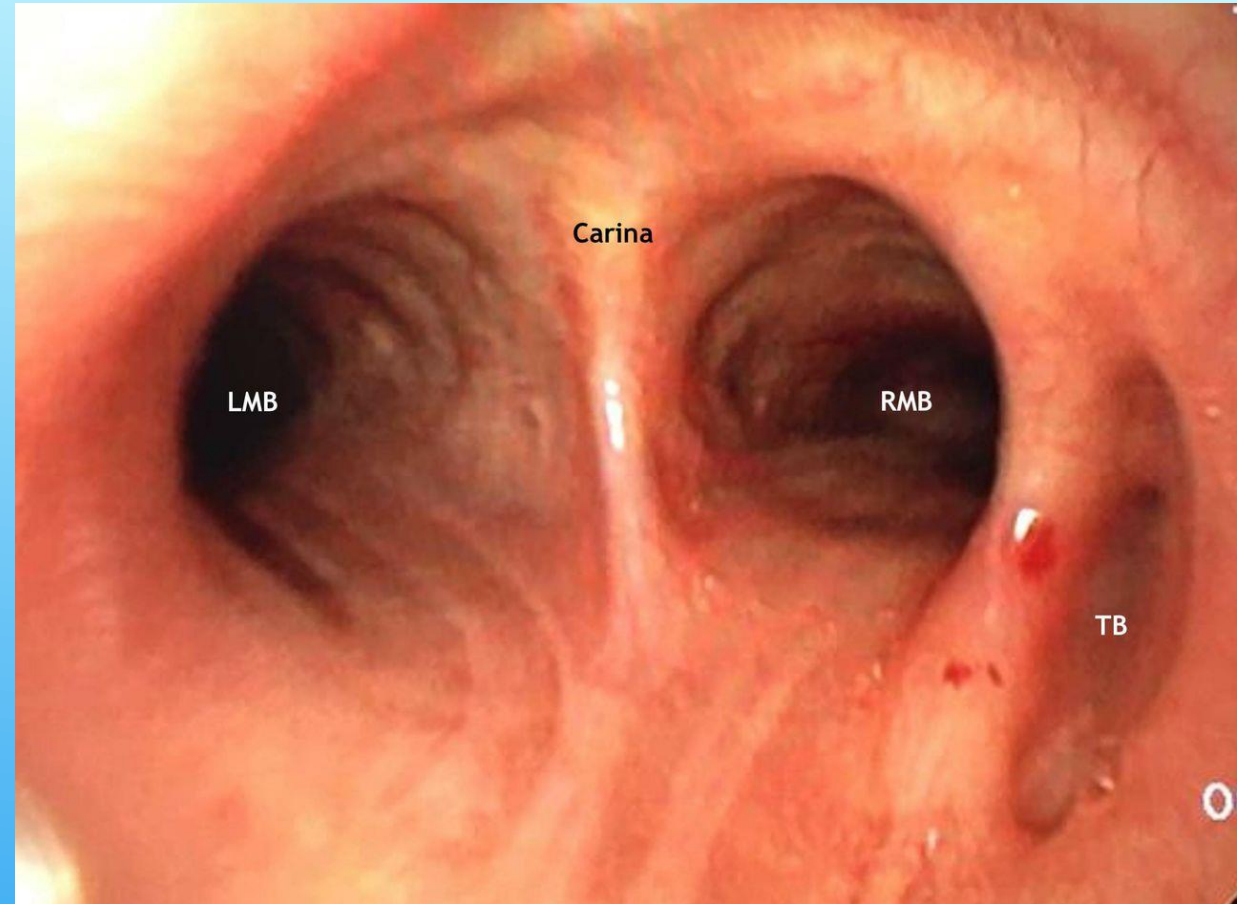




# RESPIRATORY SYSTEM

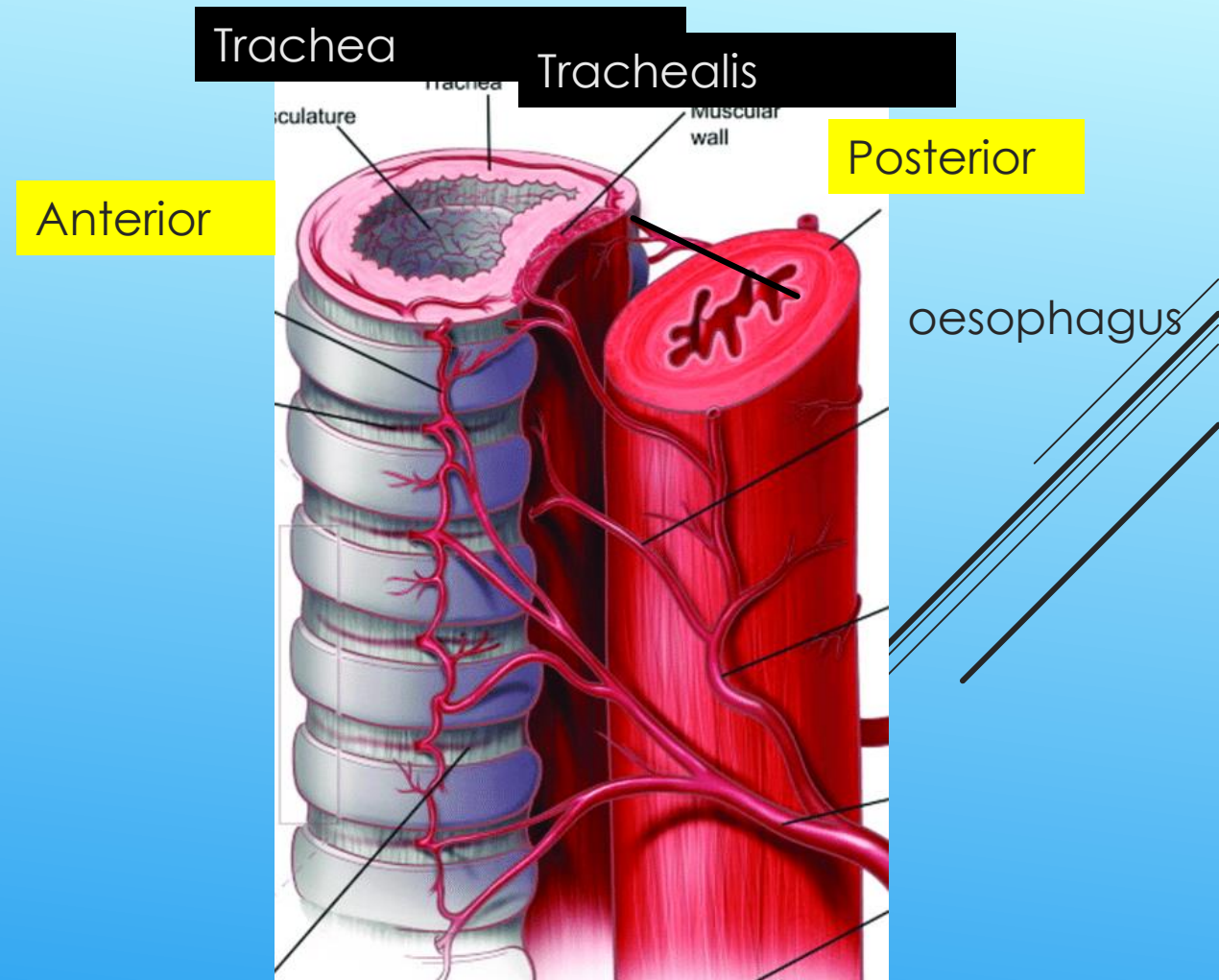
> Ends at the level of the lower border of T4 vertebra about 5 cm (2 in.) below the jugular notch. The trachea bifurcates into a right and left bronchi.

□ The tracheal bifurcation is marked by a cartilaginous spur, the carina.



# RESPIRATORY SYSTEM

□ The lumen of trachea is kept patent by 16-20 incomplete C-shaped rings of hyaline cartilages.



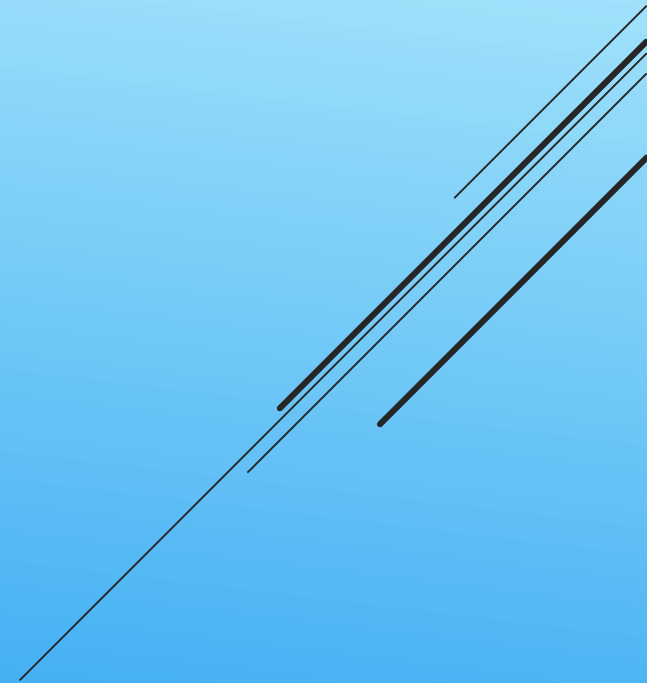
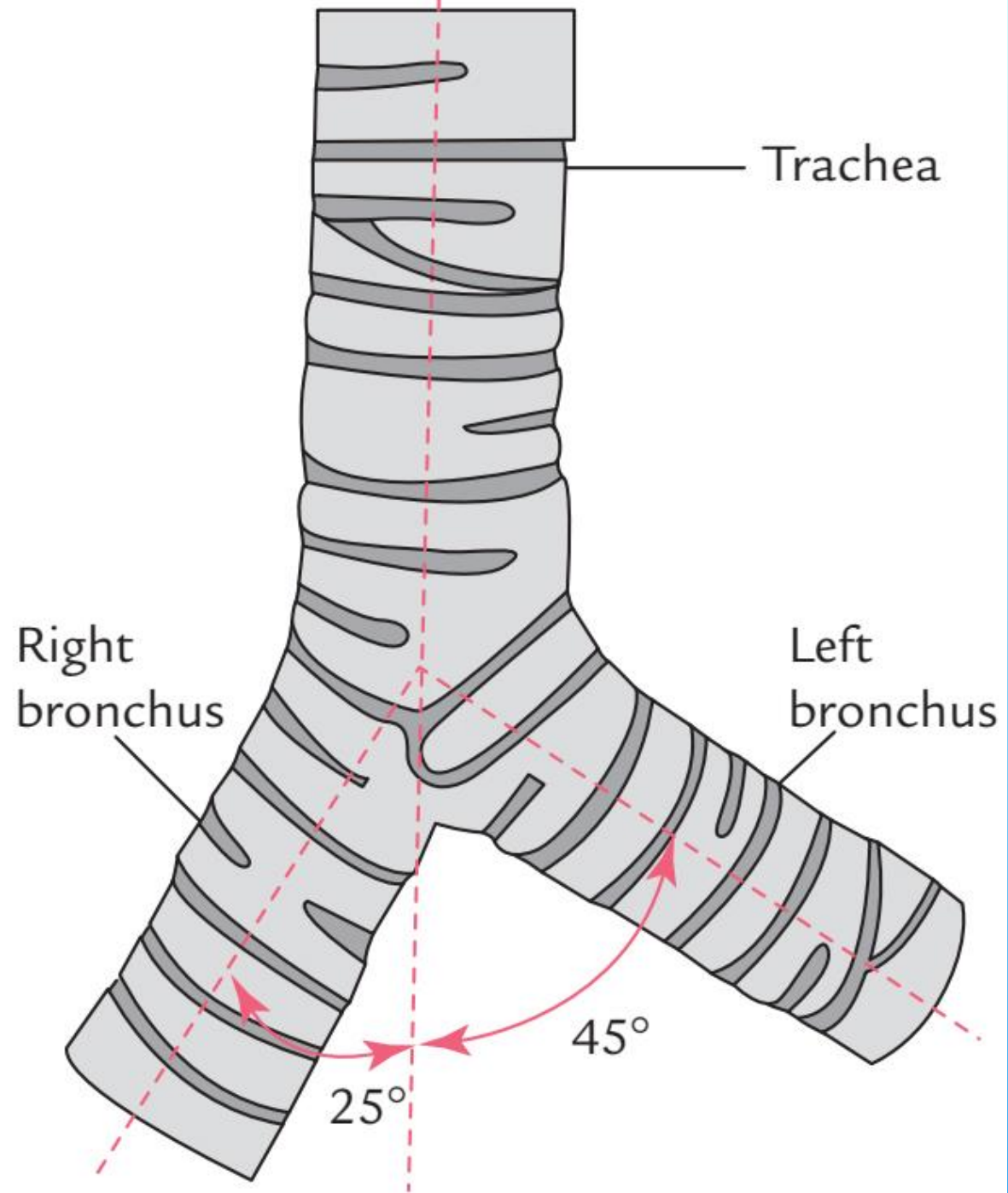


# RESPIRATORY SYSTEM

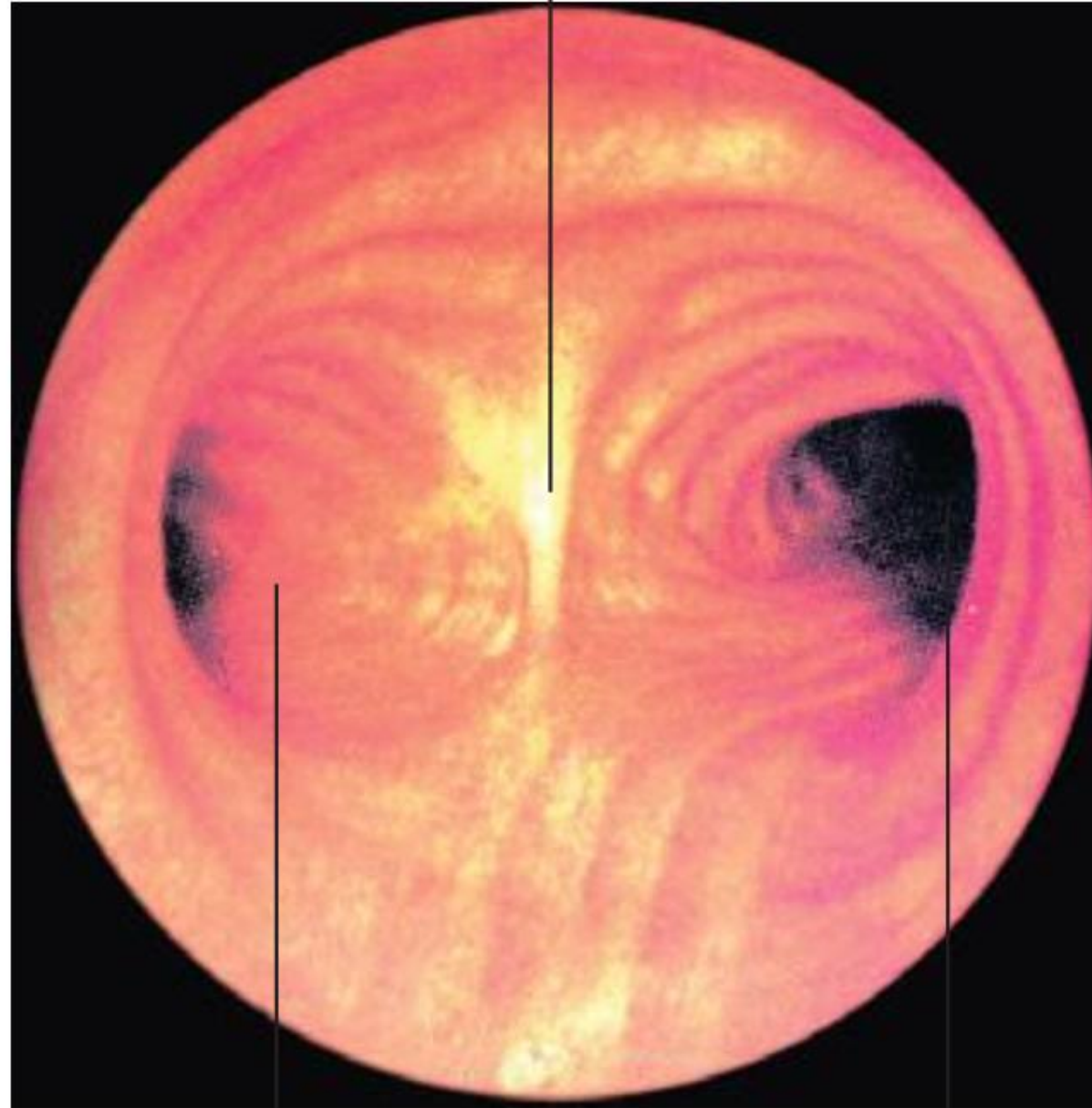
## BRONCHI

- The two bronchi arise from the lower end of trachea at the level of lower border of the 4th thoracic vertebra.
- Each branch passes downward and laterally to the hilum of the corresponding lung.

Right bronchi	Left bronchi
Shorter (about one inch).	Longer (about 2 inch).
Wider.	Narrower.
More vertical nearly in line with trachea.	More oblique (not in line with trachea)
It divides into 3 bronchi. One for each lobe of lung	It divides into two bronchi: one for each lobe of lung

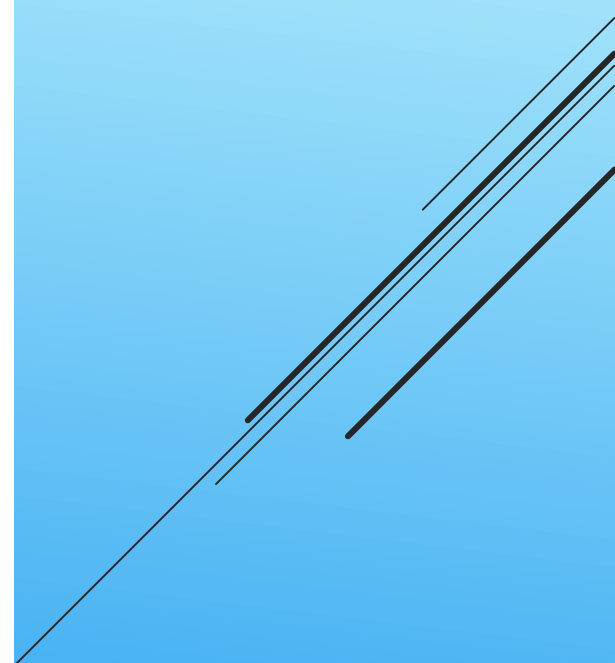


Carina



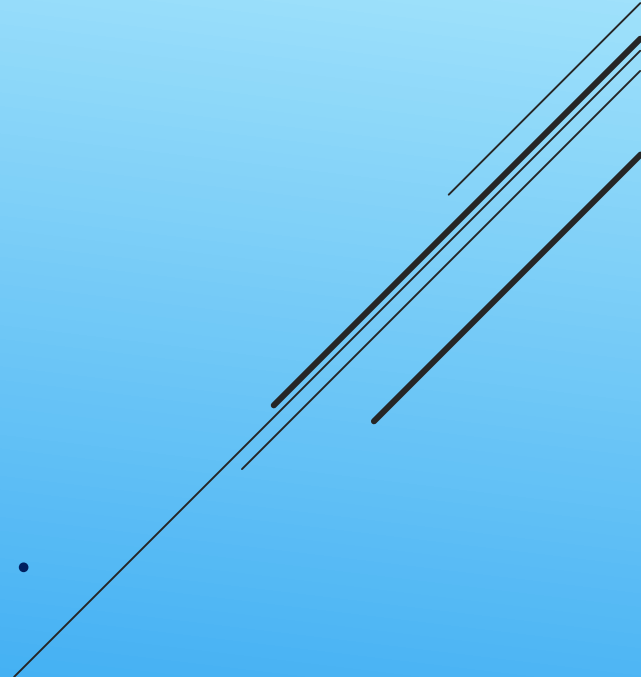
Left main bronchus

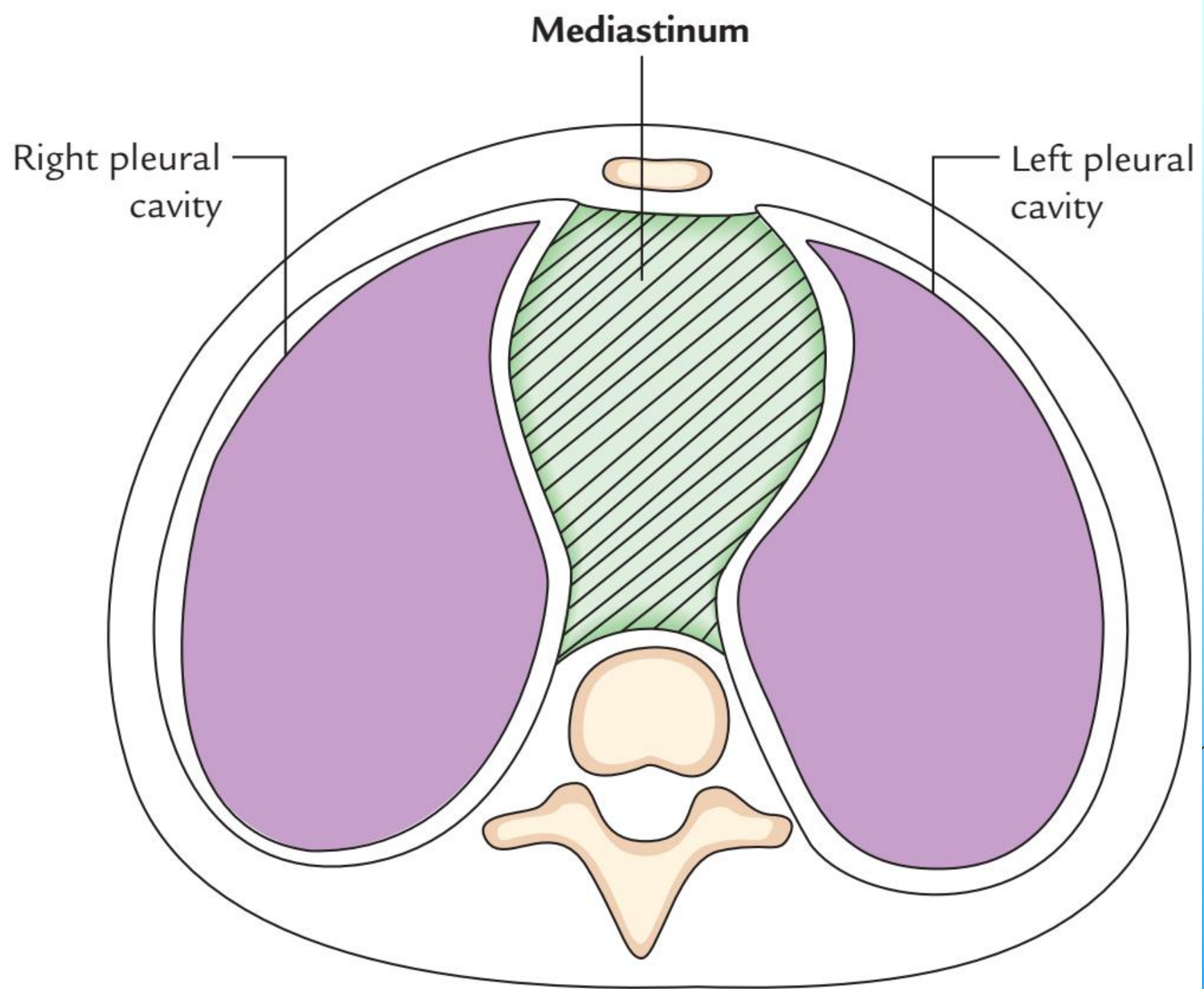
Right main bronchus



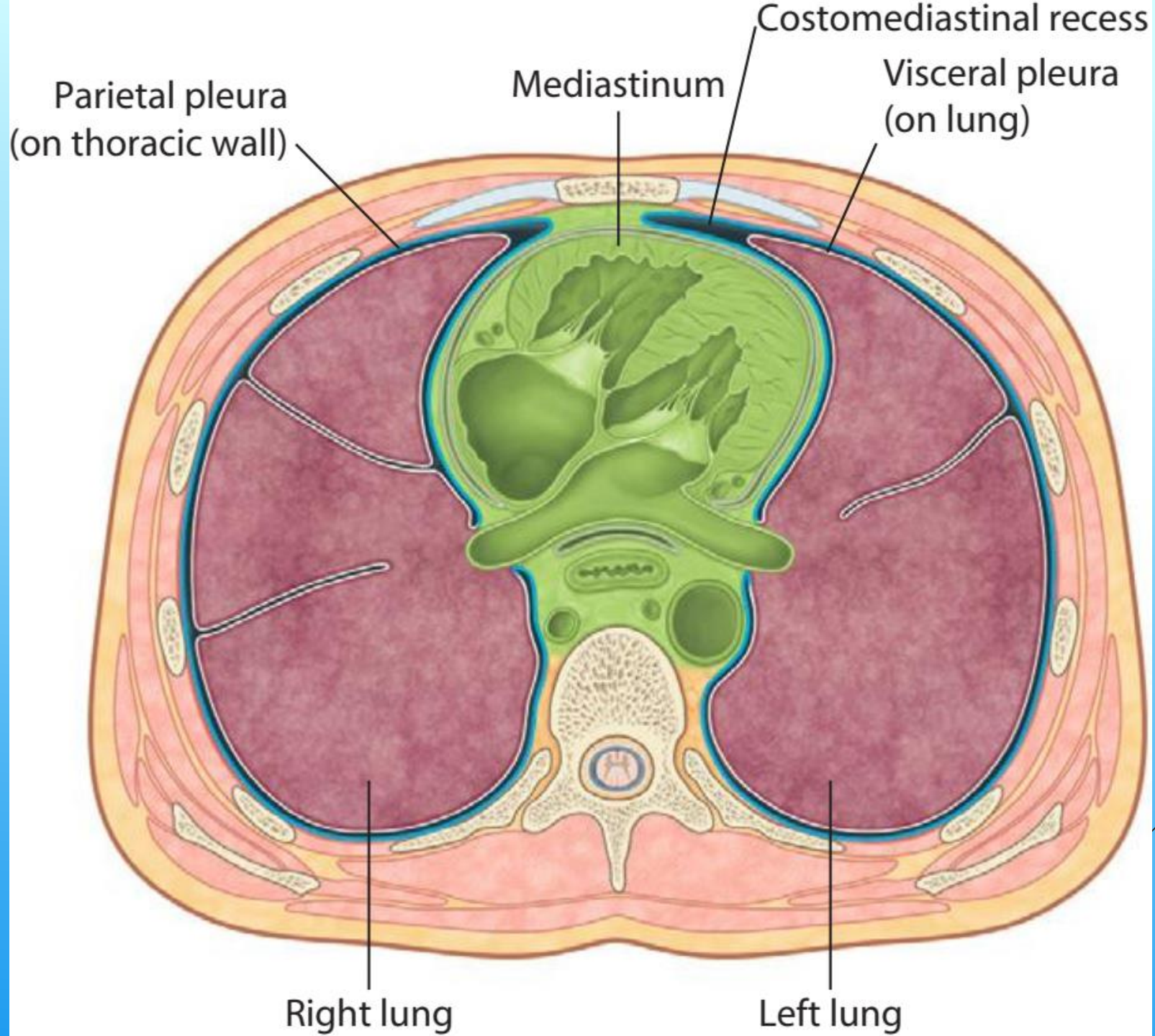
# RESPIRATORY SYSTEM

## Lungs

- There are **two lungs**, lying in the pleural cavities, separated by mediastinum
  - **Shape**: Each lung is **Cone-Shaped**, and has
    1. **An apex**: the upper end
    2. **a base**: resting on the diaphragm
    3. **two surfaces**: costal and medial
    4. **three borders**: anterior, posterior and inferior .
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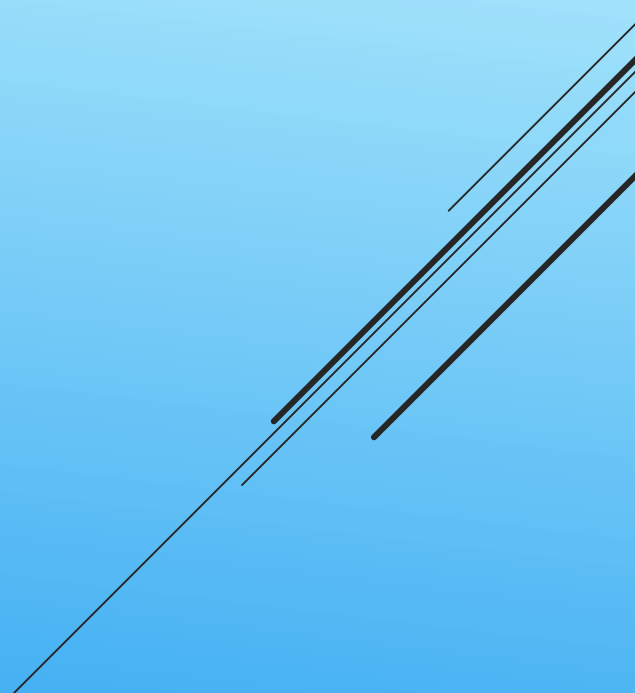


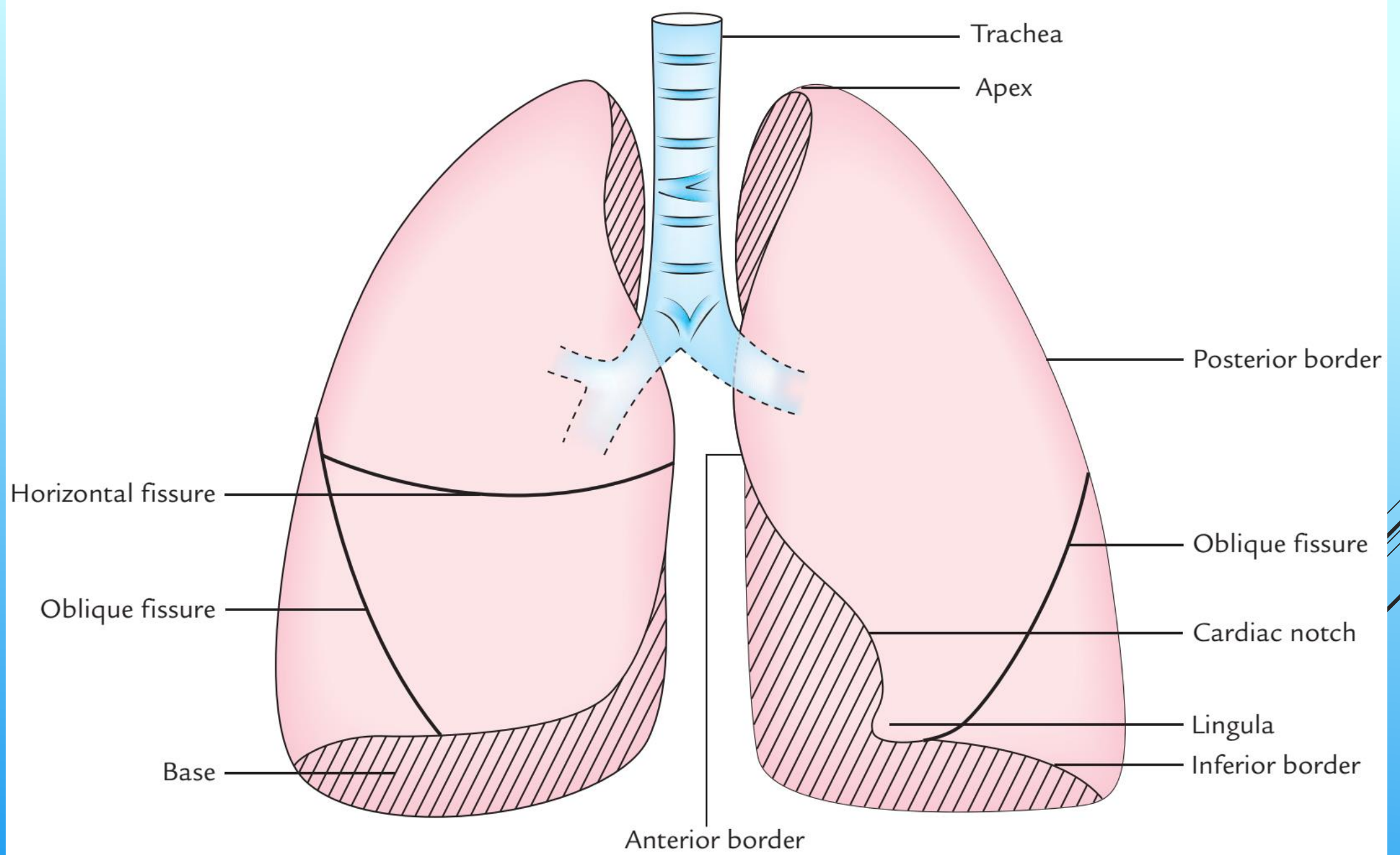




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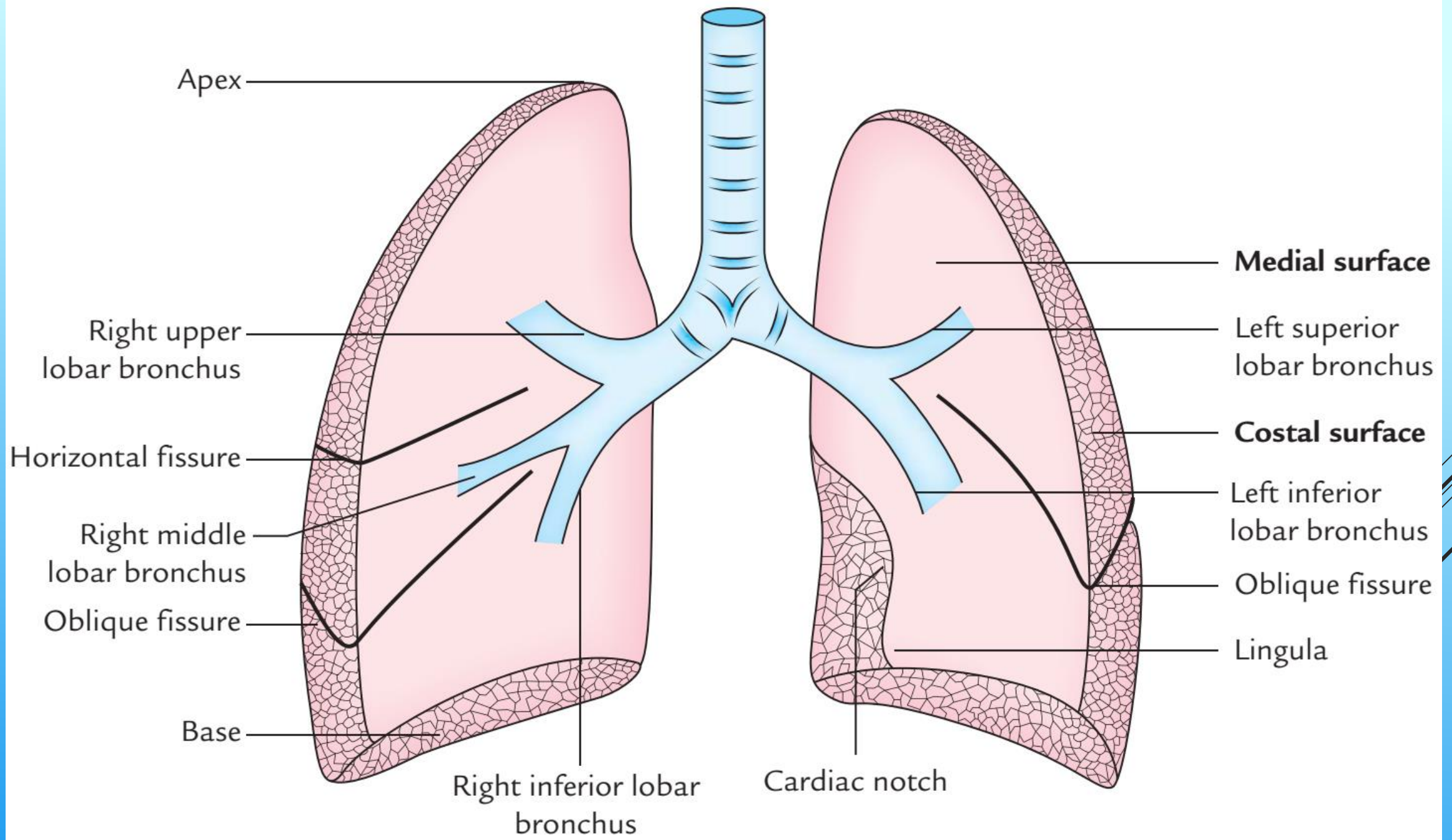
## The root of the lung:

- It is a group of structures which enter or leave the lung at the hilum
  - It is made up of the following structures:
    1. one **bronchus**,
    2. one pulmonary **artery**,
    3. two pulmonary **veins**,
    4. **bronchial** arteries and veins,
    5. **lymph** vessels,
    6. autonomic **nerves**.
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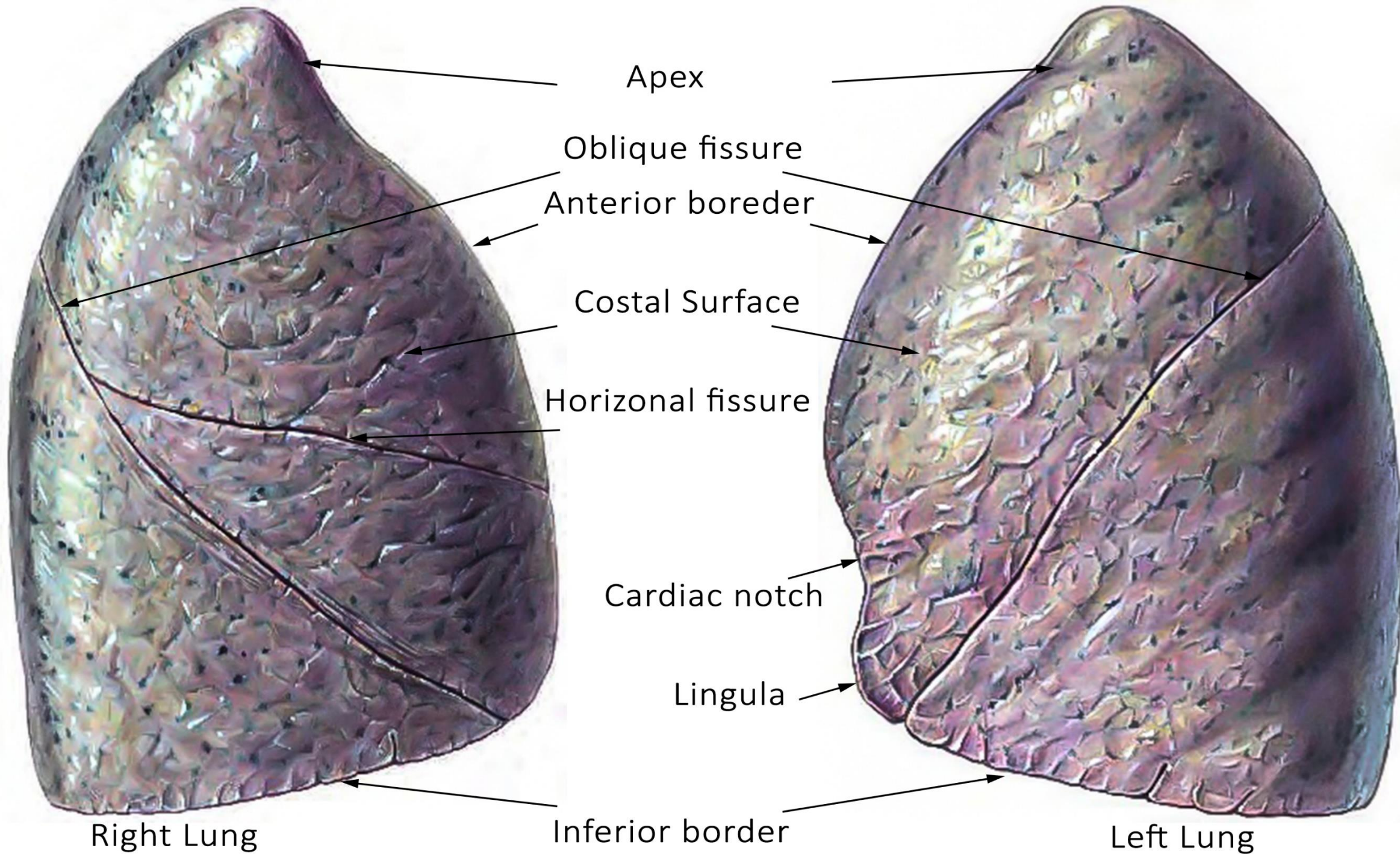
Trachea and lungs as seen from the front.



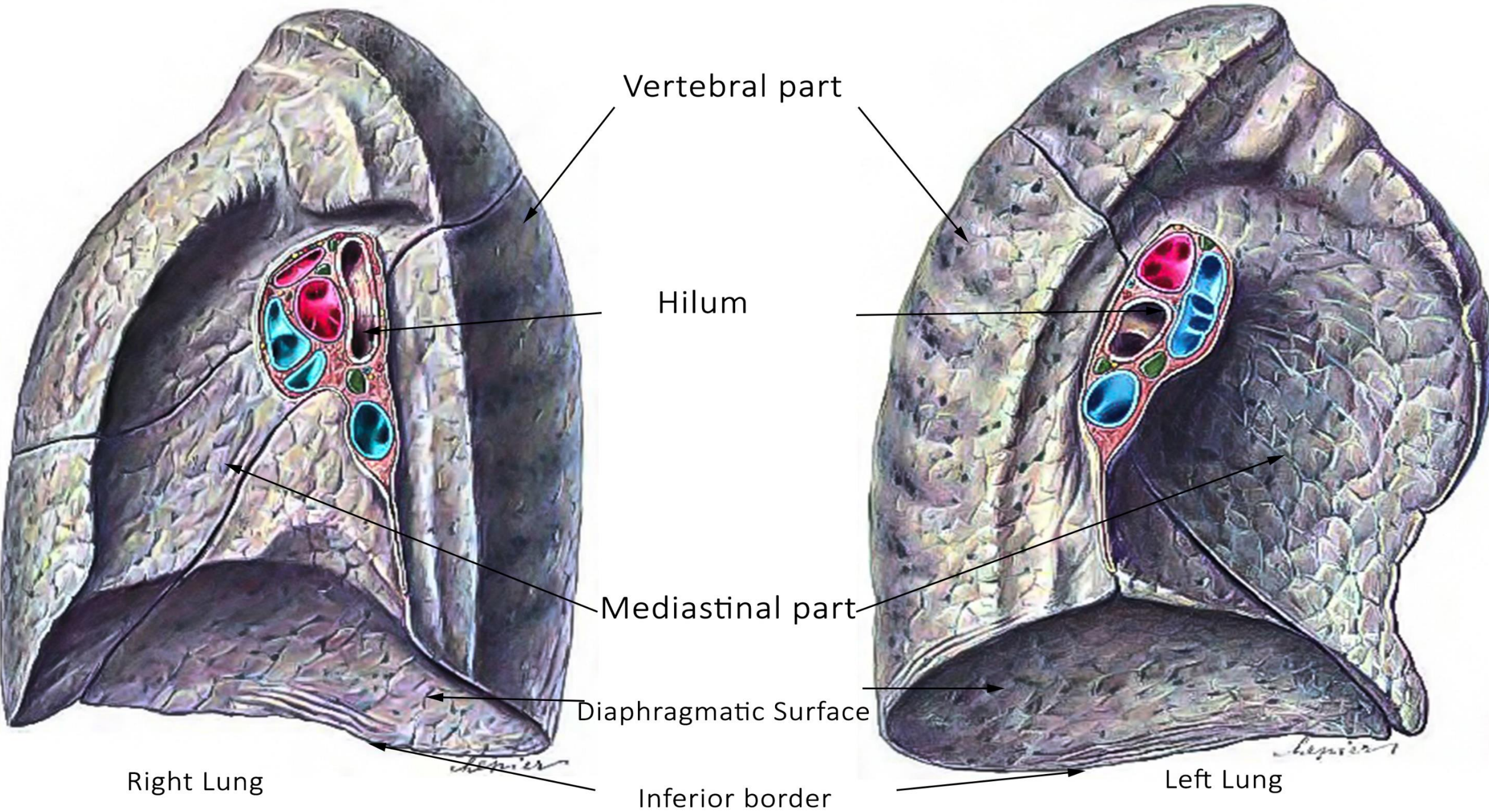


Lobes of the lung with lobar bronchi.









Vertebral part

Hilum

Mediastinal part

Diaphragmatic Surface

Inferior border

Right Lung

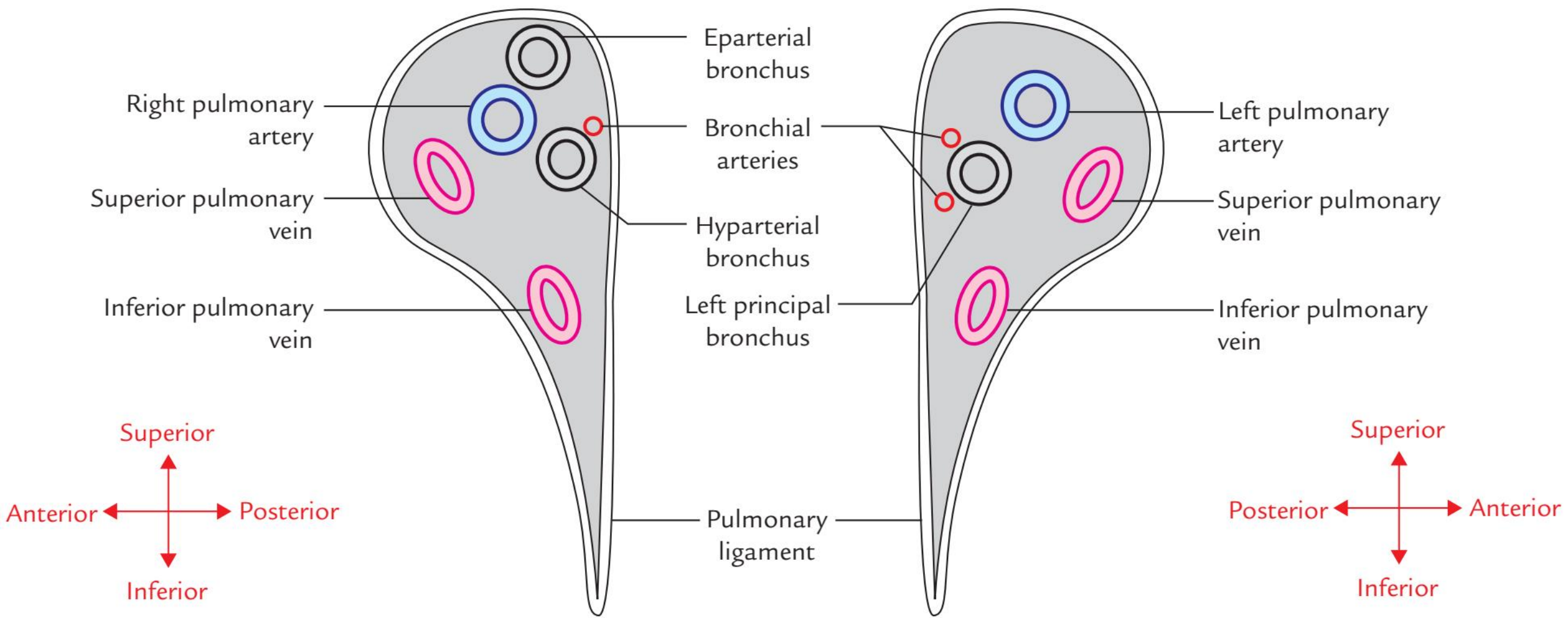
Left Lung

# RESPIRATORY SYSTEM

## Fissures and lobes of the lung

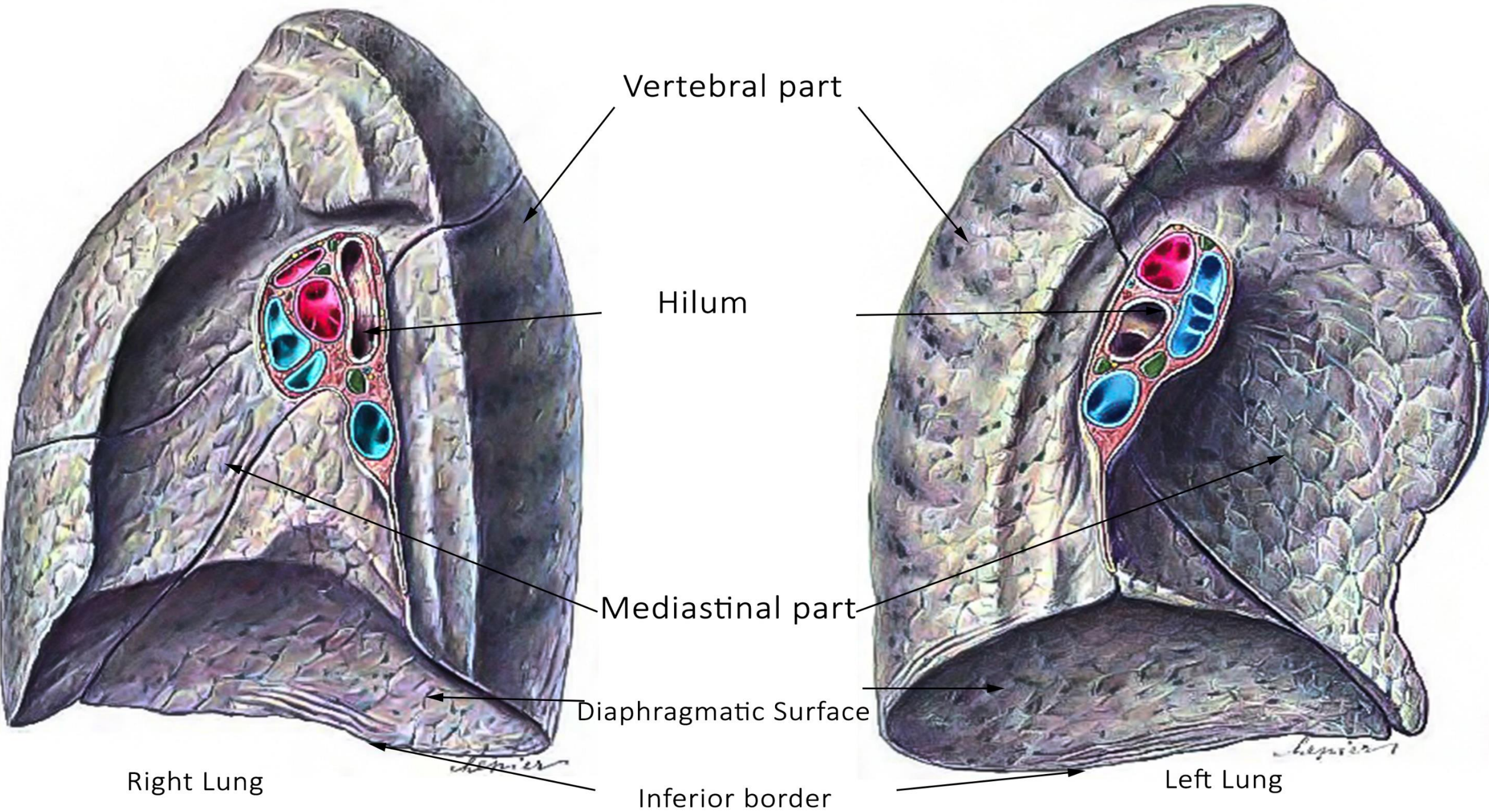
- > **Right lung**: is divided into **three** lobes (**superior, middle** and **inferior**) by **two fissures oblique** and **horizontal** fissures
- > **Left Lung**: is divided into **two** lobes (**superior** and **inferior**) by only the **oblique** fissure.





Arrangement of structures in the roots of right and left lungs.





Vertebral part

Hilum

Mediastinal part

Diaphragmatic Surface

Inferior border

Right Lung

Left Lung

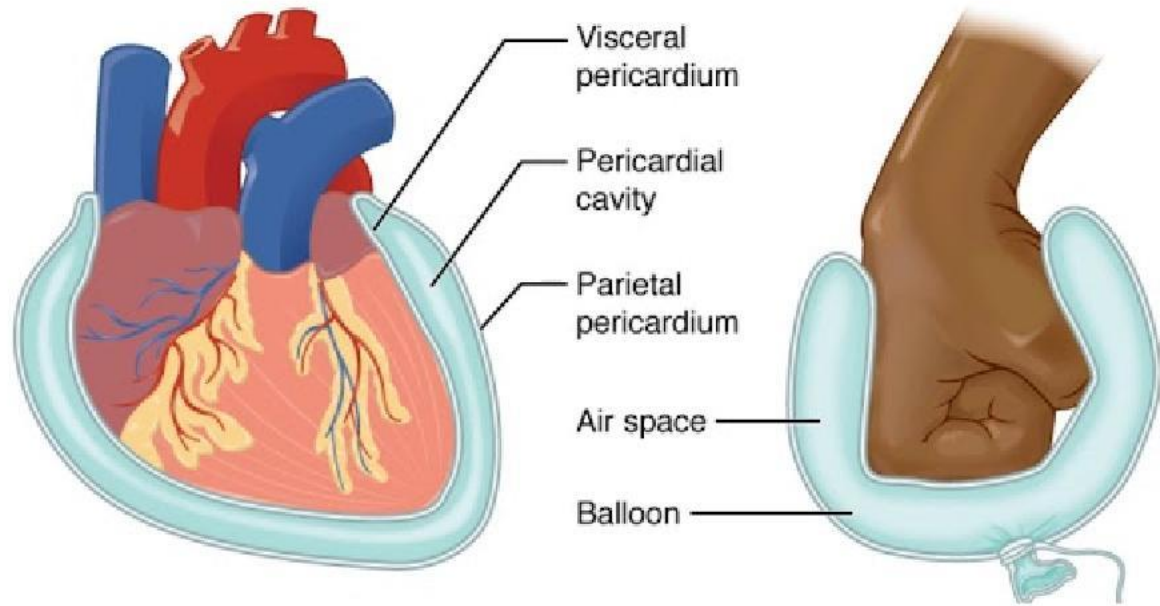
# RESPIRATORY SYSTEM

## The pleura

- It is a closed sac of serous membrane (one for each lung) which is invaginated from its medial side by the lung, so that it has:
  - A- An outer Layer: the **parietal pleura**
  - B- An inner layer: the **visceral pleura**
- The parietal and visceral layers are separated from each other by a potential space called the **pleural cavity**.
- The two layers are **continuous** with each other around the **hilum** of the lung.



# Serous Membranes



**Serous Membrane** - covers walls and organs in the thoracic and abdominopelvic cavities.

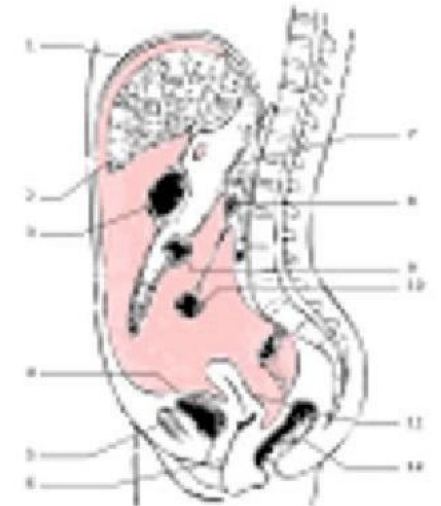
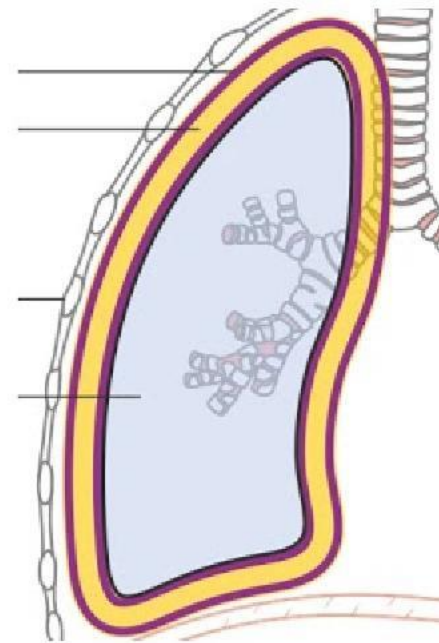
**Parietal Layer** - line the walls of the body cavity

**Visceral layer** - covers the organs (the viscera).

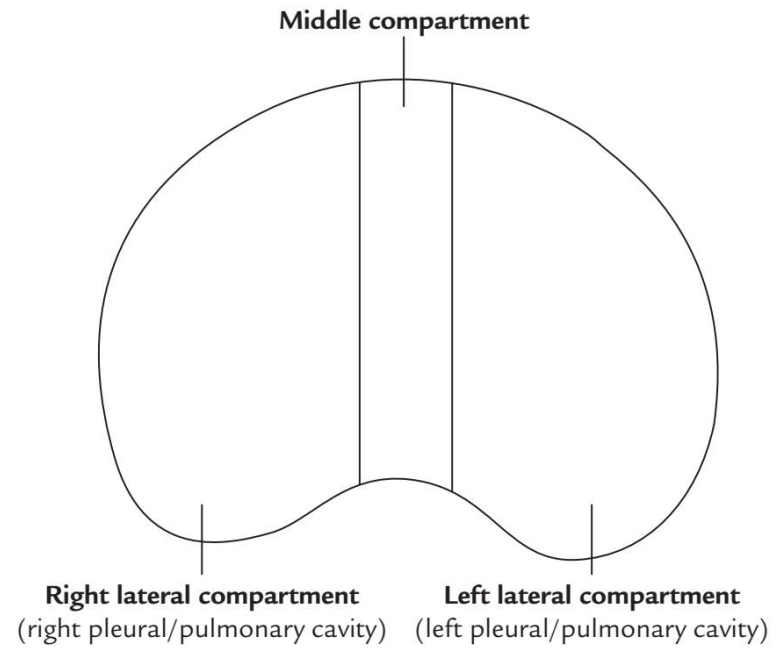
**Serous Space/Fluid** - Between the parietal and visceral layers.

## 3 Serous Membranes:

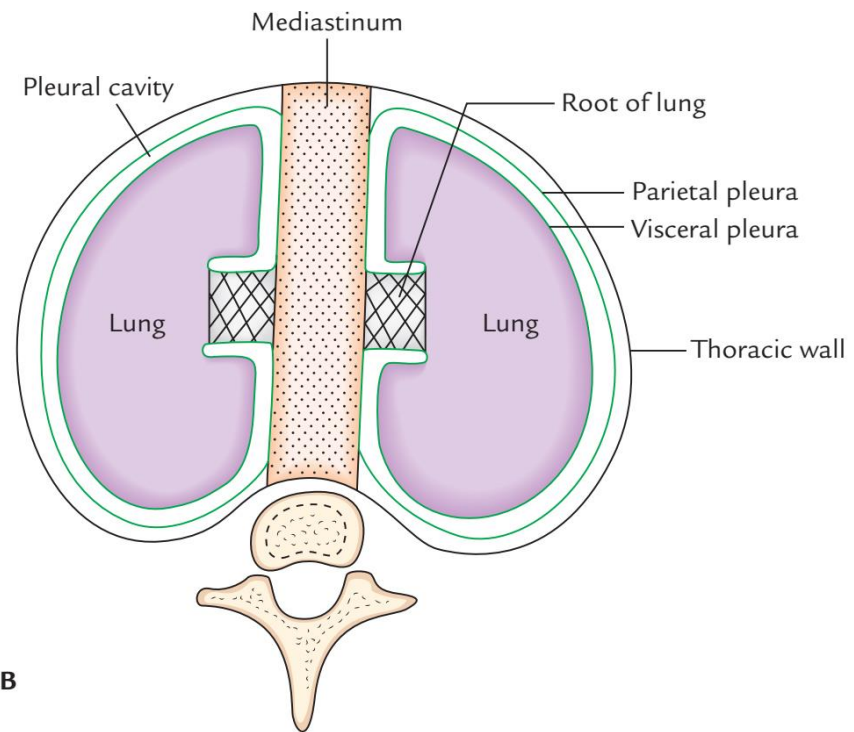
1. **Pleura** – Serous Membrane that surrounds the lungs. One for each lung.
2. **Pericardium** – Serous Membrane that surrounds the heart.
3. **Peritoneum** – Serous membrane that surrounds several organs in the abdominopelvic cavity.



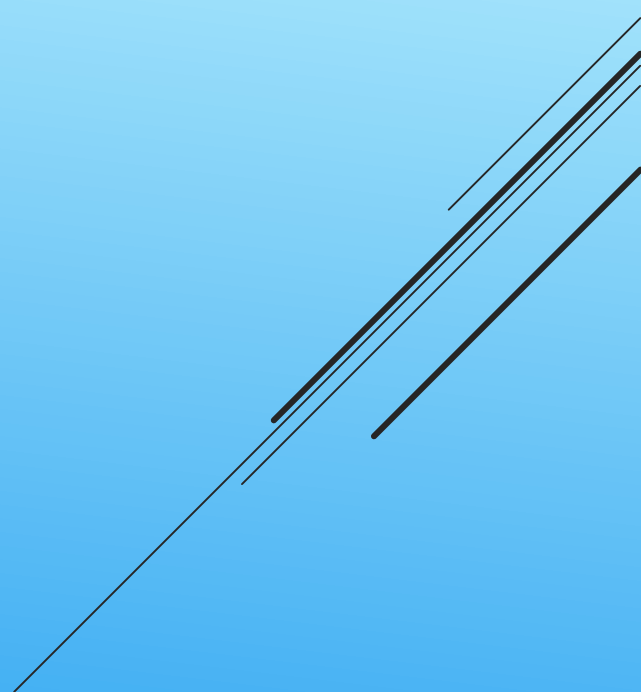


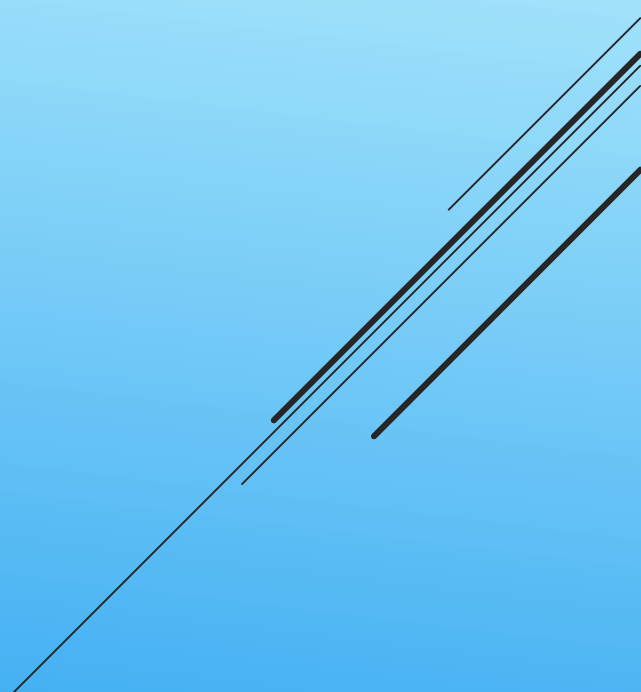
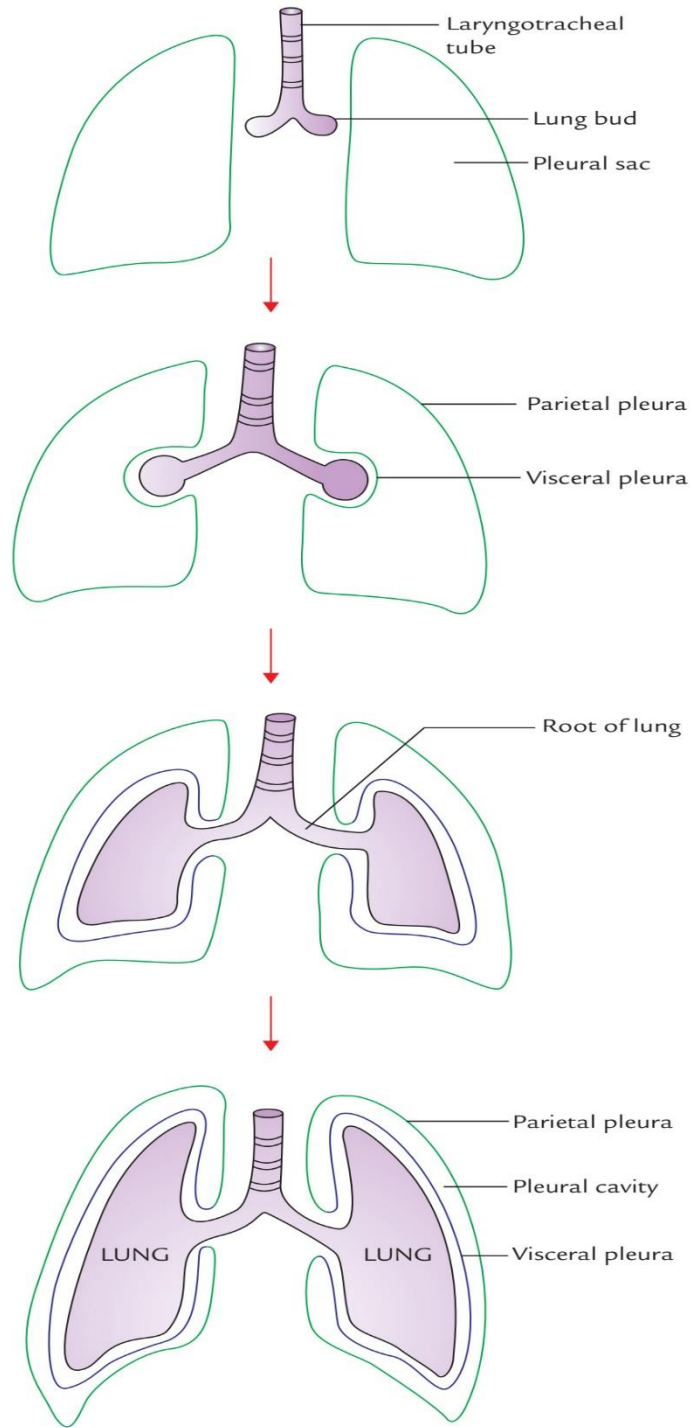


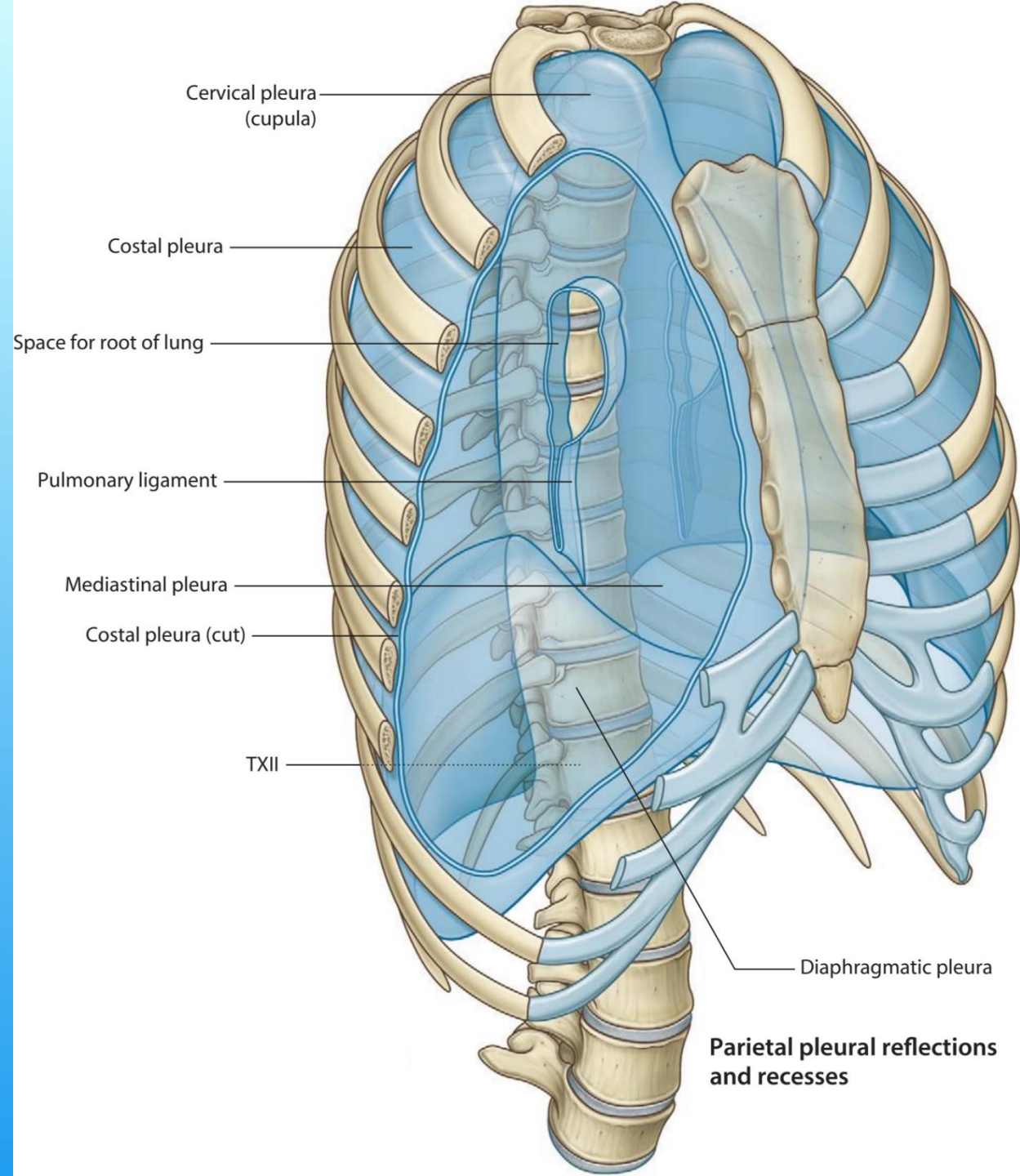
**A**

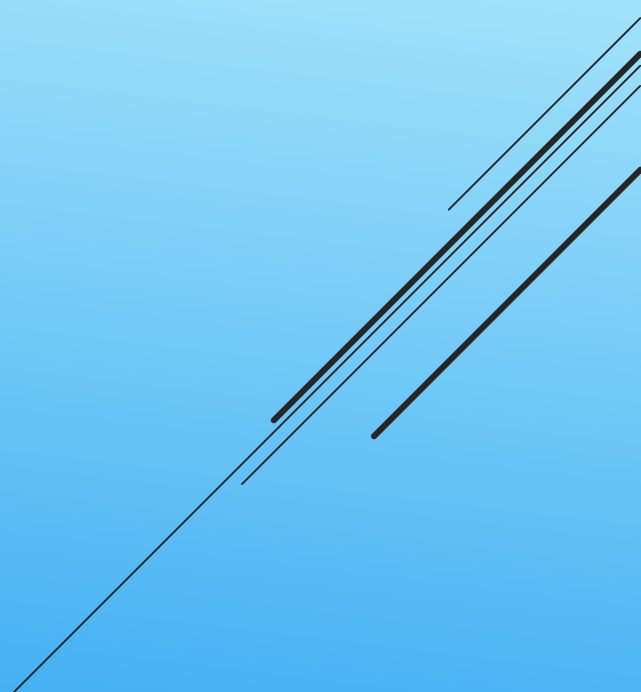
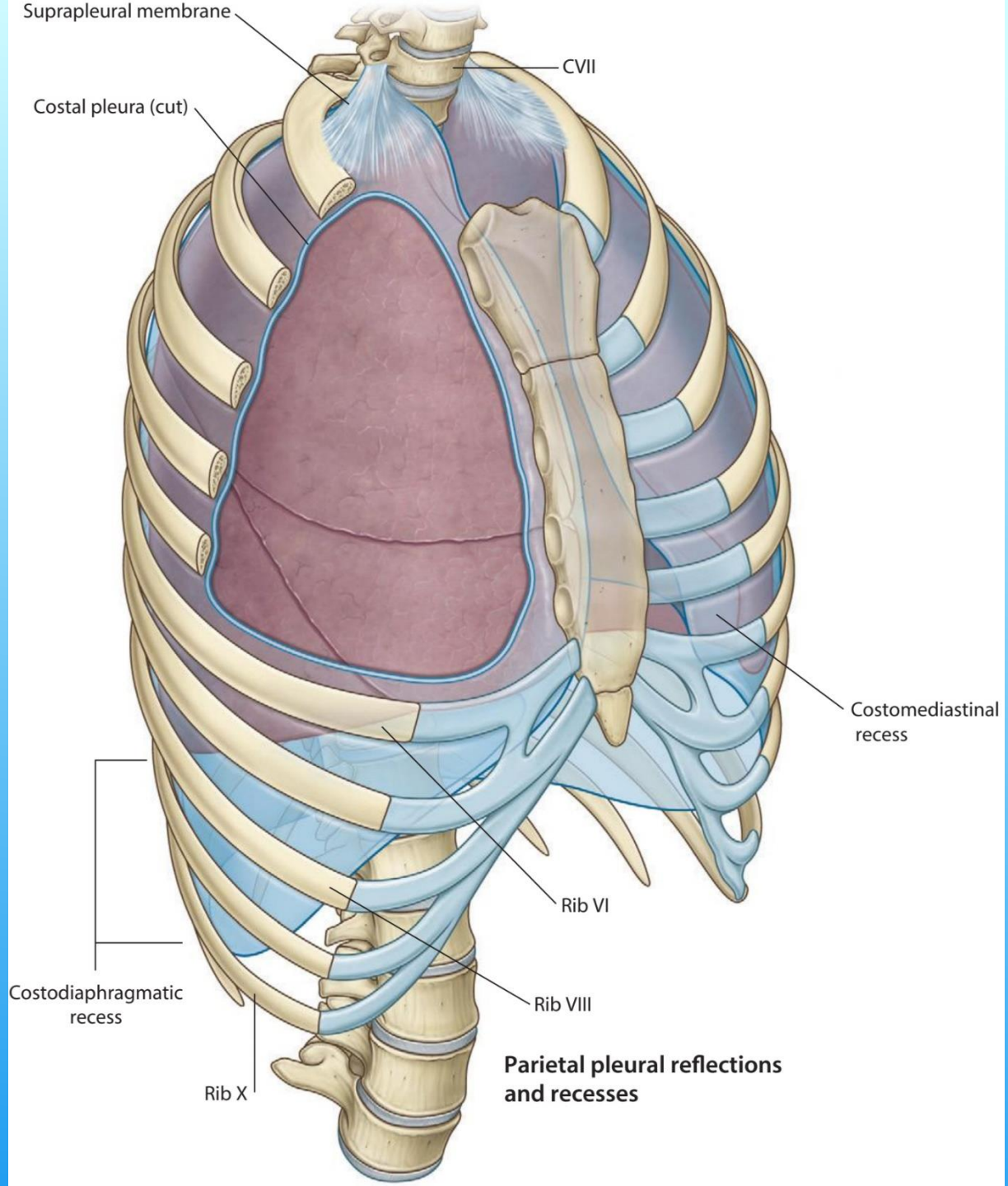


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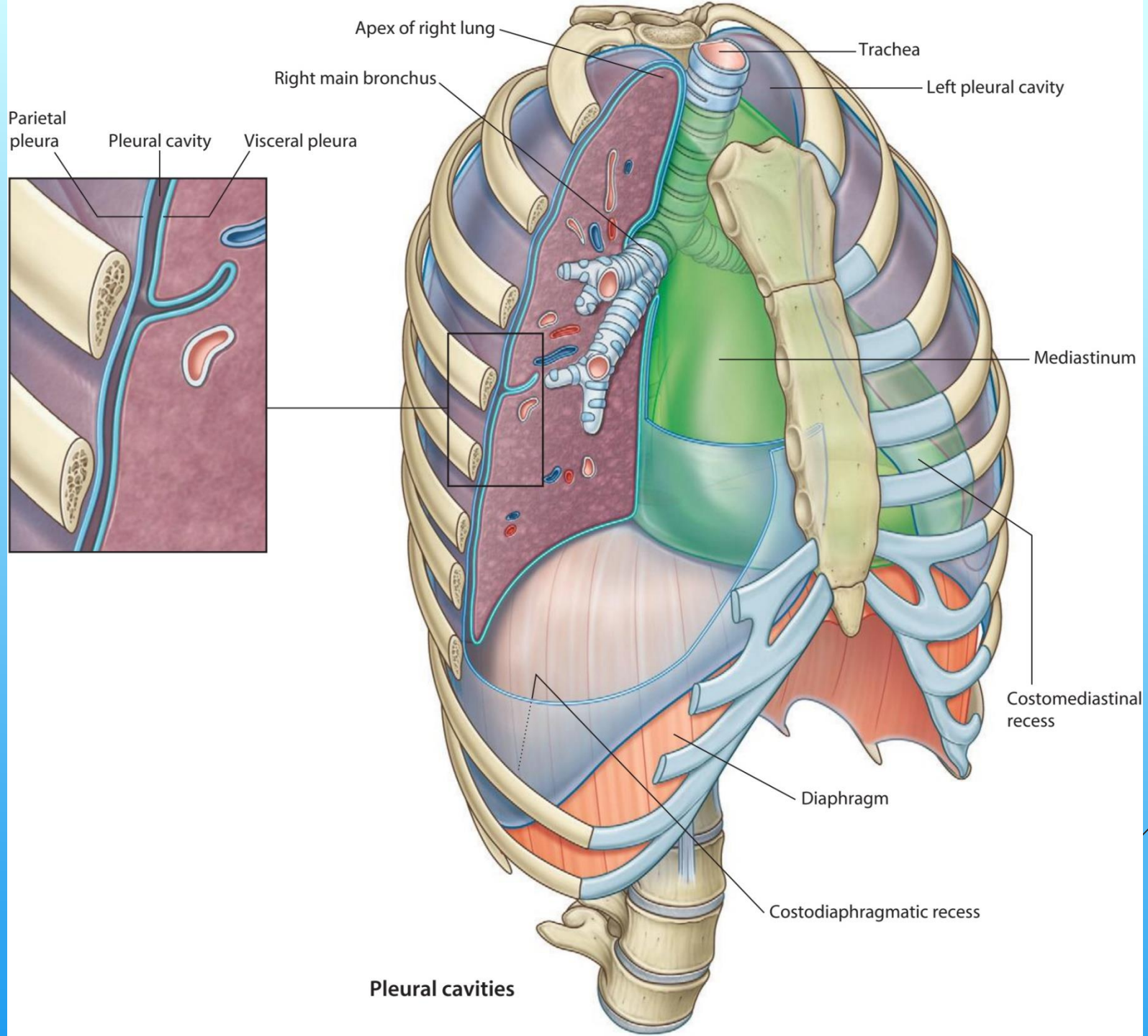






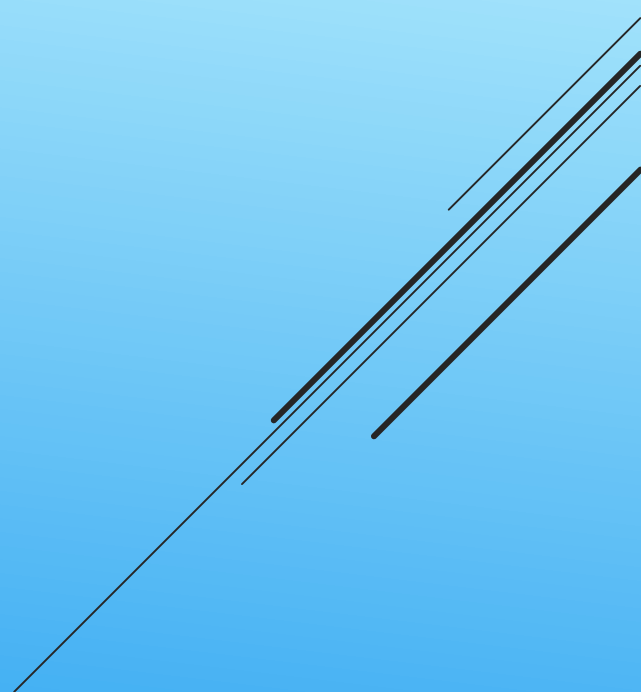






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# RESPIRATORY SYSTEM

